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THE OUTSIDE STORY

Each week we publish a new nature story on topics ranging from chipmunk game theory to how tadpoles decide when to turn into frogs.

EDITOR'S BLOG

He'd shoulder a backpack made out of wooden crates, attach a tin pail to his belt, and be up on the mountain by five in the morning. He'd hand pick berries until 3:30, then head home and decide whether to sell them to a berry buyer for 10 cents a quart, or sell them himself for 25 cents. Professional pickers averaged 100 quarts a day. (From "Huckleberry Picking.")

WHAT IN THE WOODS IS THAT?

We show you a photo; if you guess what it is, you'll be eligible to win a prize. This recent photo showed a nostoc algae community.

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Cover Photo by Chris Mazzarella

Chris Mazzarella was photographing a river otter swimming in the partially frozen Connecticut River when this red squirrel showed up and voiced his displeasure with the whole affair. "It was scurrying about," Mazzarella said, "in a way that suggested I find my way home." He took a few shots before leaving, including this one that captured the squirrel landing in a pile of snow.

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from the Center

A postcard arrived in the mail last week, encouraging me to "clean up" or "sell out" my woodlot. There were people in my area waiting to assist me! I should act now, before my "mature trees rot."

To be fair, I don't know the person who sent the postcard, and I'm in no position to judge intentions. However, it's disconcerting when trees are described as if they're old groceries lurking in the back of the refrigerator. This kind of solicitation makes me cringe for the unwary. There are too many sad stories of people cutting trees now and regretting it later because they neglected to get disinterested advice on the actual value of their timber stands, or learn about local habitats, or think through their own goals for the land.

If you examine the small print at the bottom of this page, you'll see that *Northern Woodlands* is published by a nonprofit, and the mission of that nonprofit is to promote forest stewardship. What stewardship looks like is somewhat of a Rorschach test, but I think it's fair to say, at minimum, that it involves people making thoughtful, well-informed decisions about how to care for forests in the long-term. It means people doing their best to leave land in as good or better condition than they first encountered it.

Starting with this issue, we'll be running stewardship stories in our Knots and Bolts section that explore different ways people manage their woods. Funding for these articles is made possible by a grant from the Plum Creek Foundation.

We are grateful for this support. And, since winter is the traditional season to give thanks: we are grateful to everyone who has contributed to the work of the Center for Northern Woodlands Education this year. In the back of this issue, you will see a roster of all of the individuals and institutions who made financial donations in our 2013 fiscal year. Not listed, but also greatly appreciated, are all of the writers, photographers, and illustrators who contributed content, the experts who tolerated our incessant questions, and the many readers who shared the magazine with friends.

I can't emphasize enough how critical all this support is. So, thank you. Thank you for caring about forests and for your enthusiasm for our small nonprofit's work. Thanks for your letters, the photos of your chainsaws, and the funny emails we keep pinned to our staff message board. Thanks for including our educational materials in your classrooms and for competing in our "What In The Woods Is That?" on-line guessing game. Thanks for the many walks in the woods, the talks over coffee, and the sample home brew.

And thanks, especially, for being good stewards. We hope this winter finds you outside with the trees – mature, rotting, and otherwise – enjoying the beauty of the season.

Elise Tillinghast, *Executive Director, Publisher*

The mission of the Center for Northern Woodlands Education is to advance a culture of forest stewardship in the Northeast and to increase understanding of and appreciation for the natural wonders, economic productivity, and ecological integrity of the region's forests.


32


44


24


56

features

departments

A Look at the Season's Main Events

By Virginia Barlow

	December	January	February
FIRST WEEK	Adult insects have become scarce, but birds are very clever at gleaning the twigs, trunks, and buds of trees for overwintering eggs, larvae, and pupae / The seeds of hophornbeam that now litter the ground are enclosed in papery envelopes – puffed up little sacs much like those of the hops from which they take their name / Look in wet areas or roadside ditches for the bright stems of red osier dogwood – much more colorful now than most other vegetation	Jan. 2-3: The Quadrantids meteor shower produces up to 40 meteors per hour at its peak. This year the moon sets early in the evening, leaving a dark sky / Pileated woodpeckers make large, oblong feeding holes at all times of the year in their search for carpenter ants, their primary food / Hibernating mammals warm and rouse themselves, usually every few days. This may be because they become sleep deprived, for sleep only occurs at normal body temperatures	Black bear cubs, weighing about 10-16 ounces, are born / Courting male red foxes are scent marking and their urine has such a strong, musky odor that even people might notice it as they walk through the woods / Seeing a flock of snow buntings can make your day. They appear all white from below as they dip and dive across fields, but their upper parts are adorned with browns and some black / Mink often use the fur of their prey to line their winter nests
SECOND WEEK	Dec. 14: The Geminids meteor shower is usually one of the best, with 100+ meteors per hour, but this year, alas, the moon will be nearly full / In light snow you can see that the tracks of a red fox's hind feet land almost exactly on top of the front tracks. This is an animal that direct registers. A dog's tracks are not so precise / Barred owls may return to favored perches, sometimes near bird feeders where the night shift consists of small rodents	A time of silence in the winter woods / For common redpolls, this area is as Florida is to us. They breed in the subarctic and if food is scarce they come to bask here in the winter, eating the seeds of birch, willow, grasses, and other species / Downy woodpeckers are digging out wood-boring beetle larvae from tree trunks, a favorite, fat-rich winter food / Raccoons and skunks are avoiding the cold; look for their tracks when the thermometer rises	The range of the northern cardinal is moving north, helped perhaps by warmer winters and a trail of well-stocked birdfeeders / Deep snow makes life difficult for fox and deer, but it allows the snowshoe hare to reach a new supply of shoots / A downy woodpecker or two may be seen in flocks of chickadees, and they may rely on the smaller birds to alert them of danger / Cattail flowerheads disintegrate throughout the winter; each one releases 125,000 or so seeds
THIRD WEEK	Hemlock cones open in dry, cold weather, releasing their winged seeds to the wind / Deer often bed down in groups and the depressions they leave in the snow show that they each tend to face in a different direction, the better to look for predators / Most northern flickers are wintering in the southeastern states; some may be working on the fire ant problem / Mice will move indoors after a heavy snow. Considering their size, they make a lot of noise	A January thaw often occurs around this time. Watch for honeybee flights / On warm days snow fleas climb along tree trunks to the surface of the snow. They look like a sprinkling of pepper – except that they hop / Chickadee flocks have a hierarchical structure and are stable, unlike the loose-knit flocks of most other small birds / Not just owls, but hawks and some other birds cough up pellets consisting of the indigestible parts of their recent meals	Turkeys don't really mind the cold, but deep, fluffy snow makes it difficult for them to find food. Manure piles may be looking good now / There can be up to 120,000 winter ticks on a moose, though a mere 40,000 is more typical. Mild winters favor ticks / Sometimes the fruits of wild grapes turn into raisins and stay well into winter, a plus for wildlife / Caddisfly larvae are carrying their cases along stream bottoms and feeding, much as they do in summer
FOURTH WEEK	Christmas fern stays green all winter. Each of its little leaflets is shaped like a stocking – perhaps a Christmas stocking – making it easy to remember / Flocks of cedar waxwings gather where fruit is still on the tree / Sweet everlasting lasts well into winter, as does its fragrance, a bit like new mown hay / New seed catalogs arrive in the mail. Time to plan next year's garden	Jan. 28: Average end of the January thaw / A fisher can get by on about one snowshoe hare, a squirrel or two, or 14 or more mice per week. A porcupine will sustain a fisher for a month / Snowshoe hare rest in safe places most of the day, usually in thick low conifers. They tend to feed during the night and at dawn and dusk / The days are getting longer and the chickadees have noticed even if you haven't. Listen for their territorial spring "fee-bee" song	Raccoons go wandering on the warmer nights, and may not end up in the same den that they started from / Male red-winged blackbirds are returning. They make quite a racket as they choose nesting territories / Deer may lose 20-25 percent of their body weight over winter, despite a big decrease in their activity / Where the ground has thawed, early robins are getting worms / Coyote breeding season peaks. Females come into estrus once a year for about 10 days

These listings are from observations and reports in our home territory at about 1,000 feet in elevation in central Vermont and are approximate. Events may occur earlier or later, depending on your latitude, elevation – and the weather.

By Dave Mance III

I know many of you reading this don't hunt. But even so, I'll bet you've heard the one where the hunter bags his first buck. How the opportunity came as a surprise after he'd tried and failed for what seemed like so long. How the emotions came in waves as he approached the downed animal: joy, sadness, triumph, in no particular order. The hunter is usually a boy and there's usually a turn in the story where his dad comes and they hug – the smell of wool as his nose is crammed against his father's chest. Then some ritual: a prayer for the fallen deer, maybe blood smeared on his cheeks.

And then he's a hunter.

These stories are resonant because many of us were lucky enough to have some version of this experience. Look, we say, to all who didn't. This changed me. But life is complicated – hunting is complicated – and things don't always follow the script.

Hiya shot his first buck last October – 13 yards with an arrow. He's not a boy. He's 71. Hunted for almost 60 years but just never connected. He's a kind and affable man and everyone in camp has rooted him on for decades. So, of course, when the day finally came he was in camp alone. It was a beautiful Sunday morning – picture him ambling slowly out into the dawn, walking into a moment that was going to change him forever. He got within a hundred yards of his ground blind and then changed plans at the last minute, thinking that when the deer came off the hill they'd see the blind, turn, and walk right past him.

He nailed it. That's exactly what happened.

I was sitting in town that Sunday morning, reading the newspaper at the kitchen table, when the call came. I could hear Hiya's voice trembling a bit, jangling with nerves and soul. Being a natural storyteller, he took his sweet time getting to the point, burying the lede again and again.

"So then the second deer turned . . ."

"DID YOU GET HIM!?"

" . . . and I considered drawing . . .."

Yes, he'd shot the deer. Yes, there was blood. By then I was already in my truck, roaring towards his son's house.

These are big woods we hunt, and it took J – the son – and I more than an hour to get up to that little hardwood nob near the top of the mountain. We found Hiya sitting on the tree stump where he'd shot the deer. He told us the story again in rich detail. The deer had "busted" him at 13 yards – look, right there. He'd hung a flag on a tree. They'd locked eyes and he'd fired an arrow into the deer's brisket and the deer turned and wisped away like a puff of smoke. "I've never seen a deer that close," he said, his eyes shining.

We started following the blood trail, J and I coursing the foreground like a couple of rangy hounds, Hiya walking as far as the last splotch of blood and then standing there as a reference point. The blood was steady at first but then slowed. We slowed, too, eyes straining to pick up legitimate blood as the deer ran through red maple leaves.

Archery is a crude form of hunting. Whereas a bullet breaks bone, and the rifle shot itself can carry a hydrostatic shock wave that can knock a deer's feet out from under him, the archer selectively aims for a pass-through shot in the front third. The goal is to hit a vital organ, and short of that, to open a hole in both sides so the deer will lose blood and expire. You're not supposed to take straight-on shots because there's too much bone to deflect the arrow, and even if you miss the shoulders, there's a good chance the arrow won't exit, and you won't have a very big hole. If the animal bleeds internally you might never find him.

About five minutes into our tracking exercise we saw all this written in the blood. As the trail got harder to follow, Hiya started coursing with us, the triumph draining out of him in clotted clumps. On his knees rubbing red maple leaves to determine whether the crimson was pigment or blood until it was all pigment. Two hours, then three, then four. When we lost the blood trail for good we just started circling, looking for a dead deer. At first this was disciplined, a regular skirmish line. Eventually it was just three men moving randomly. Grasping at straws. Knowing deep down the gig was up but moving fast to avoid having to contemplate the thought.

At dark we met back at the woods road, and I rode down the mountain with Hiya in the UTV. His legs were cramping up and he was in pain – all senses of that word. I didn't know what to say. I told him this had happened to me once, and I knew what he was feeling. I gave him a clumsy pep talk, telling him that the trick to hunting is to make a mistake, learn from it, then get back up the next day and try again. Even as I was saying it I could tell the words were all wrong. He wasn't thinking about hunting, he was worried about that deer.

Part of me sharing this is cathartic, knowing that other hunters have felt this pain and will empathize. Part is a public service: here's a cautionary tale to think about before you let the arrow or bullet fly. Part is just that old riff on how life is often more complicated than any cliché.

That night Hiya stared at the ceiling, grieving for the deer that had a miss-shot arrow shaft flush against his fading heart. This is another way one can become a hunter, though I wouldn't wish it on anyone.

Fond Memories

To the Editors:

Ah, the Autumn 2013 issue – another masterpiece. But this time it also kindled some fond memories with "The Multiplier Effect" story by editor Dave Mance III. My father, Scott Jr., a 6th generation Vermonter, born in East Arlington in 1906, shepherded his family off to Washington D.C. in 1942 to take a position as an attorney for the Senate small business committee. That was a wartime generated job, and we settled in a newly constructed apartment complex adjacent to Fort Drum, an anti-aircraft battery protecting the flanks of the nation's capital.

We took with us a newly acquired set of Cushman fine grained, maple finished yellow birch furniture, which included a "cobbler's bench" coffee table and a side table. It furnished two bedrooms, a living room, and a dining room. At the end of the war in 1946 we began a series of moves to Nantucket, Massachusetts, and then New York homes in Albany, Stuyvesant, Kinderhook, Colonie, and then my own move to Lowville in 1958. The furniture, in ever diminishing numbers, accompanied each move.

And now, my granddaughter Cassandra Gray will be moving to Greenwich, New York. She will be taking with her the recently refinished Cushman dining room set, which includes a double drop leaf table with four side chairs and master armchair – all with beautifully sculpted seats. The set is a tribute to the quality and craftsmanship of those earlier furniture makers. She is a ninth generation Gray and now our family is getting even closer to making a complete loop back to our roots in East Arlington.

I still have the cobbler's bench and plan to refinish it, for the second time, this winter. How wonderful it would be if we could accelerate an improving trend to move wood manufacturing back to our own country.

Scott K. Gray III, Lowville, NY

Not at all Self-Evident

To the Editors:

Virginia Barlow's fine piece on northern red oak (Autumn 2013) might have mentioned that our Declaration of Independence was written using ink made from the wasp-produced oak galls to which she refers. And for those who might want to delve more deeply into the subject, I can certainly recommend William Bryant Logan's wide-ranging 2005 book, *Oak: the Frame of Civilization*.

Arthur H. Westing, Putney, Vermont

To the Editors:

Thank you for the excellent "Overstory" about northern red oak, one of my favorite trees. A minor correction: Though red oak is the northernmost oak found in our region, it is not the most northern of all the oaks. Red oak extends north to latitude 48° in eastern Canada, but in North America, bur oak (*Quercus macrocarpa*) reaches 53° in Manitoba, Canada. English oak (*Quercus robur*) tops them all, extending beyond 62° along the warm waters of western Norway.

Thanks for the great article and keep up the excellent work!

Mike Gaige, Malta, New York

A Mighty Wind

To the Editors:

I read your article on the 1938 hurricane with interest, then photographed the child's chair that was given to me as a little girl. It was one of the pieces of furniture made from the blown down trees. Probably from Connecticut.

Sally Barngrove's hurricane chair.

Sally Barngrove, Reading, Vermont

To the Editors:

I just finished reading the article "One for the Ages" by Stephen Long in the August issue of Northern Woodlands Magazine. I must say it was a very in-depth and educational piece. It explained a number of questions I have had over the years about what I had observed in the woods.

While deer hunting in New Jersey back in 1958, I witnessed a number of depressions and mounds of dirt next to them. At the time I thought someone had dug trees out from that spot but it was in a difficult area to dig up trees. After reading about Stephen Long's investigation, I now know what took place and that they were blowdowns from a storm many years ago.

Thanks for the great articles you have in your magazine.

Don Reinhart, Canajoharie, New York

From the Web:

Ted Natti, who was State Forester in New Hampshire when I worked there in the 1980s, was fascinated by forest history, the '38 hurricane in particular. He told stories of lumbermen stashing white pine logs in lakes and ponds because the mills couldn't handle the mass of wood. Nor could the market, I suppose. Those logs are still found today and fetch a high price.

I've learned a lot about hurricanes since moving to Florida. One thing to consider when looking at a site is that 'canes often generate small tornadoes, especially in the northeast quadrant. That could account for some of the patterns.

Gail Michaels in Florida

In Memoriam

Legendary scientist and conservationist Hubert "Hub" Vogelmann died this past October at age 84. Hub was a giant in Vermont conservation circles who helped found the Vermont chapter of the Nature Conservancy and UVM's Field Naturalist Program. He'll be missed.

We love to hear from our readers. Letters intended for publication in the Spring 2014 issue should be sent in by January 1. Please limit letters to 400 words. Letters may be edited for length and clarity.

Photo by Mary Holland

Last fall, naturalist Mary Holland had a wild grouse follow her on a hike through the woods; when she stopped, the bird went so far as to hop on her knee (inset). She reconnected with the bird several times that autumn, then lost touch in winter. She revisited the area after a snowfall to see if the grouse was still around and found this two-holer, an indication that the bird may have found another friend.

Story and photo by Bryan Pfeiffer

The Winter Warbler

Yellow-rumped warbler

It is an aster in winter, sun through the clouds – a force of nature called the yellow-rumped warbler. Find its buttery warmth even when life outside seems to groan or crunch or crack in the cold.

By now the songbird rainbow in our forest has vanished – most warblers have migrated south. These sparkling birds eat mostly insects, which have died or gone dormant. But the yellow-rumped warbler, feisty and flighty, is a lesson in adaptation.

Novice or careless birders might overlook this warbler, whose winter plumage hints at a brown, streaky sparrow. Although the sunny sides to the breast have faded, the yellow-rump, while occasionally hidden below the folded wing tips, is universal year-round.

Universality is a trademark of this warbler, which birders affectionately call "butterbutt." Although it breeds in coniferous woods across the northern half of the continent, the yellow-rump can feed in a range of habitats. In summer, when most warblers glean insects and other prey from foliage, the yellow-rump adds flycatching – snapping prey from mid air – to its repertoire. While the Cape May warbler and its northern relatives sequester themselves in spruce boughs during migration, the yellow-rump is an exhibitionist, often landing on a naked twig. I've seen them feeding nearly everywhere, from downtown lawns in Montpelier, Vermont, to wrack lines along the Atlantic coast.

More to the point, in winter, when most of their kin are enjoying insects in the tropics, yellow-rumps are finding food across the southern U.S. and north into New England. With insects in short supply, the yellow-rump turns to fruit: juniper, red cedar, viburnums, honeysuckles, mountain ash, and even poison ivy.

But this warbler's greatest dietary feat is that it also eats the fruits of bayberry and wax myrtle (*Myrica spp.*)– the raw materials of folksy candles. Digesting wax takes guts – literally. To do so, it appears that yellow-rumps possess elevated levels of bile salts, which aid digestion of saturated fats. They may also pass the waxy fruits through their digestive systems more than once – a maneuver researchers call "retrograde reflux of intestinal contents." You get the idea.

Whatever the strategy, the yellow-rump's gastrointestinal talents probably account for its ability to inhabit a winter range farther north than its relatives, particularly along the Atlantic coast, where wax myrtle and bayberry can be abundant and where birders, in a day, might find butterbutts in the hundreds – abundance unlike any other wintering warbler in North America. Tree swallows, classic insectivores, have a similar ability to digest bayberry and wax myrtle, which allows them to winter along the U.S. southeastern coast, where no other swallows dare swoop and swirl.

Away from the coast in the northern portions of the Northeast, yellow-rumps are a prize on Christmas Bird Counts in December and early January. We usually hear them – their distinctive flat "chek" or high "tseep" notes – before seeing them. Their abundance here in the Northeast may decline as winter progresses, particularly during severe winters.

But fear not. By February, our first migrants – turkey vulture, red-shouldered hawk, and red-winged blackbird – will begin to return. And by April, the vanguard fleet of yellow-rumped warblers, having survived a winter of retrograde reflux, will remind you that a new season approaches.

Bryan Pfeiffer is an author, wildlife photographer, guide, and consulting naturalist who specializes in birds and insects. He lives in Montpelier, Vermont.

By Michael Snyder

What Determines How Tall A Tree Can Grow?

A tree's growth is based, in part, on competition from its neighbors. Its first priority is to gain access to the sun, and in a forest up is the only way to go. (An open grown tree will grow out – notice how a yard maple is all crown and no stem.)

But this explains why a tree grows tall, not how. How tall a tree will grow is dictated partly by its genes (you can coddle a pin cherry all you want, but it'll never be as tall as even a runt black cherry.) The tallest trees in the northeast are white pines, attaining heights over 150 feet with the very tallest pushing 170 feet. Our tallest hardwood is white ash, capable of growing 150 feet tall.

A tree's height is also dictated by environmental conditions. Most trees are capable of being taller than they actually are, they're just limited by deficiencies in light, water, or nutrients.

The tallest trees on the planet are coast redwoods. Giant sequoias are, pound for pound, more massive (three times the mass of the largest animal, the blue whale) but still about an eastern tree shorter than the tallest redwoods. Indeed, the tallest known individual tree on Earth is a redwood, known by the nickname Hyperion. Measured at 379 feet, Hyperion is 209 feet taller than the very tallest tree known in New England.

Why are redwoods so much taller than our trees – and everyone else's?

It comes down to water – not so much water supply, but the physics of moving water. We all know trees need water and that it comes from the ground. Transporting water from the roots, on through the trunk, and up to the leaves is a challenge. Unlike in animals, a tree's vascular system has no heart; there is no pump of any kind. Water is not pushed up the tree. Instead, it is pulled from above: water molecules tend to stick to each other and to other substances. When moisture evaporates from the surface of a leaf, it pulls along a column of water that extends all the way back to the roots. The water is pulled from the soil to replace what was lost above. As a tree grows taller, it becomes increasingly difficult to get water to its topmost leaves. Eventually, this leads to drought stress and reduced photosynthesis and growth.

All trees have to deal with this reality of physics, but those lanky redwoods deal with it better than any others. And according to some researchers, their superiority may derive largely from the fog in which they live. Gigantic redwoods exist only in a narrow band along a few hundred coastal miles in northern California. They grow in wet temperate forests in steep valleys, buffered against wind, and receive well over 100 inches of precipitation annually. These forests are marked by consistently cool, moist conditions and an abundance of fog.

Evidently, redwoods are able to absorb water from fog directly into their leaves. According to the National Park Service, stewards of the tallest of them, fog accounts for 40 percent of a redwood's moisture intake. So instead of fighting against the physics of pulling hundreds of gallons of water from the soil through the tree's complex – and really long – vasculature, they avail themselves of a more handy source. With access to water in the fog right near the leaves, the plumbing problem becomes something of a plumbing advantage.

If snow, wind, drought, and blackflies conferred a physiological height advantage to trees, ours would be taller for sure.

JIM BLOCK

Forester John O'Brien and a (presumably) really tall eastern hemlock

Michael Snyder, a forester, is Commissioner of the Vermont Department of Forests, Parks and Recreation.

Story and photos by Susan C. Morse

Gray Squirrel Caching and Feeding Sign

Everyone is familiar with the amazing and often amusing acrobatics of gray squirrels partaking of bird feeder fare. Despite our efforts to stop them, gray squirrels defy gravity and will hang upside down from any climbable surface to access the bounty of suet and black oil sunflower seeds. Specialized ankle joints enable determined sciurids to completely rotate their hind feet to better grasp and hold on.

In the wild, the mainstays of a gray squirrel's winter diet are stored nuts and seeds, including acorns, hickory nuts, beech nuts, black walnuts, hazelnuts, and butternuts, as well as maple and box elder seeds. Come spring, the buds and flowers of oak, hickory, elm, willow, and poplars, as well as apple and sycamore, are consumed. Summer's developing berries, drupes, and pomes are eagerly sought – especially the fruits of hawthorn, apple, cherry, dogwood, grape, raspberry, and blackberry. The larval and pupal stages of many insects are also eaten. One scientific account described gray squirrels searching the surfaces of car radiators, looking for the remains of grasshoppers, dragonflies, crickets, and other insects. The periodic emergence of the 17-year cicada provides a tremendous source of food for gray squirrels as well. Various mushrooms, the inner bark of young maples and other smooth-barked trees, and the very occasional fledging bird or small mammal round out the diet. Calcium and other minerals are obtained from bones, antlers, and turtle shells.

Unlike red squirrels, gray squirrels scatter hoard, caching winter food stores in randomly chosen separate sites, and buried nuts may be shared with other squirrels. A gray squirrel will carry an acorn to a chosen site and bury it roughly three quarters of an inch under soil and leaves. I have watched this and am convinced that the squirrel's process of tamping the soil back on top of the buried nut, using the side of its face, as well as its feet, may serve to scent mark the stash and thus enable the owner to find it later on. It is believed that gray squirrels use both memory and olfaction to find buried nuts.

A gray squirrel deliberately caches acorns of the red oak group, subgenus *Erythrobalanus*, that germinate in the spring, yet they treat acorns of the white oak subgenus, *Leucobalanus*, very differently. More than 50 percent of the time, gray squirrels remove the seed embryo from white oak acorns before caching them. This prevents the autumn-germinating acorn from developing a taproot, which squirrels do not eat. Removal of the seed embryo preserves the food value of the stored acorn.

Susan C. Morse is founder and program director of Keeping Track in Huntington, Vermont.

Clockwise from top: a descending gray squirrel with rotated hind feet; gray squirrel tracks and acorn fragments at a cache site; bone retrieved from tree where it was stored (note incisor grooves); an acorn stored at the base of a moose barking scar.

[FORAGING]

Black Birch Tea: A Delicate Winter Brew

Black birch tea was one of the first wild foods I ever tried. Some high school friends boiled pots of birch twigs to make what they called "brew" while telling jokes and stories over the campfire. I always thought that the brew tasted like little more than slightly bitter hot water, and it is indeed easy to make a bland tea of the black birch, but I have since learned to make a much tastier beverage that can be had by anyone willing to steep with care.

I have brewed tea most often from twigs of the black birch (*Betula lenta*), but northern foragers may be more likely to find its cousin, the yellow birch (*B. alleghaniensis*). Both trees make a fine drink at any time of year, but I am most drawn to them in winter, when other foraging opportunities are few, and they become contenders for the tastiest plants in the landscape. (They are far superior to other wild-tree teas, such as pine and spruce.) Black birch is easily distinguished from the similar-looking (and toxic) cherries by the fresh, wintergreen odor that the twigs release when scratched.

I harvest a slim branch with a pair of garden shears the day before I want to enjoy the tea. It is the twigs I want, so if the tree is in leaf I strip the leaves off by running it through my fingers. Then I use the shears to clip the branch into six-inch segments and stuff them into a half-gallon canning jar. And here we come to the first mistake of the novice forager: using too few twigs. I stuff my jar until no more will fit.

The wintergreen flavor of the birch tree is imparted by methyl salicylate, an organic compound that is easily vaporized. That's why birch tea is so aromatic, but it is also why it's so finicky to brew. Twigs must be fresh. Flavor is lost after only a day or two. And, most important, your brewing water cannot be too hot. This is the second mistake of the novice. If you add boiling water to the twigs, you will literally evaporate their flavor. I boil water in a kettle and allow it to cool for about 15 minutes before pouring it over the twigs. After sealing the container, I steep it overnight. Unlike the teas of most herbs, which become bitter when left to steep for more than a few minutes, too short a steep here results in a flavorless tea.

I have often enjoyed birch tea cold, but in winter I prefer to gently reheat the brew and savor the sweet smells, warm my fingers on the mug, and remember the friends who first introduced me to this aromatic winter delight.

Benjamin Lord

MOLLY PYTLESKI

[STEWARDSHIP STORY]

Forest Management 101

The roar of a chainsaw breaks the stillness of the cold winter morning. I wade through knee-deep snow to retrieve a newly fallen balsam fir. With sappy gloves, I drag the fir pole to a fresh bundle of trees that will be hauled by ATV to the nearest landing; with triangular snow tracks instead of wheels, the machine looks like something out of Star Wars. The crackling of a tree resonates to the right. Another tree down – a beech this time, small but already showing symptoms of beech bark disease. This is a typical morning as Assistant Forest Manager at North Country School.

Located outside of Lake Placid in New York's Adirondack Mountains, North Country School is a small, independent school for children in grades four through nine that has been offering a diverse, outdoor-based education since 1938. Here, students learn skills ranging from raising and harvesting poultry to designing and building theatre sets. Since last October, I have been working with Forest Manager Tucker Culpepper on 200 acres owned by the school and 150 acres of adjacent private land. The forests that we manage include a sugarbush, white, red, and Scotch pine plantations, and spruce-fir lowlands.

Much of our management consists of removing low quality trees so that the better-quality trees can flourish. Tucker explains the process as "leaving the best and taking the rest." The trees that remain will provide wildlife habitat and natural beauty; some will someday be harvested to provide lumber for the school.

The wood we harvest is used in our school's 1.4 million btu/hour woodchip boiler, which provides heat for the 32,000-square-foot main school building, and two 500,000-btu/hour cordwood boilers. To feed the woodchip boiler, we cut trees that are 3 to 6 inches in diameter and up to 12 feet long. After the trees are felled, we remove the limbs, leaving the crown and branches on the forest floor. This allows nutrients to be recycled back into the soil. We haul the poles to landings, stack them vertically, and let them dry for approximately seven months. When the poles reach the 30 percent moisture mark, they're run through a six-inch chipper. Over the past two years, burning wood has allowed us to reduce our fuel oil consumption by more than 80 percent, from an average of 27,000 gallons to about 5,000 gallons a year.

Because the school is on the property, we are able to incorporate education into our forestry practices. Students learn about sustainable forestry firsthand and play a role in choosing and cutting fuel wood. Each weekday after classes, students of any age have the opportunity to sign up to fell trees and stack wood. The forests surrounding North Country school also provide a living classroom for lessons in botany, ecology, and dendrology.

"Last load!" Tucker yells from across the woods. As the sun lowers to retire for the day, we drop off the bundle of trees, stack the logs, and head to the maintenance shop to clean our saws. We brush away the grime and sawdust of our day's work, sharpen the chains, and leave our gloves on the stove to dry in preparation for another cold winter morning working in the Adirondack forest.

Molly Pytleski

This series is underwritten by the Plum Creek Foundation, in keeping with the foundation's focus on promoting environmental stewardship and place-based education in the communities it serves.

[SKILLS]

This Bud's (not) For You

There's probably no better example of a love/hate relationship than the one between the forest landowner and her deer. (At least from a human perspective – deer seem to regard us with a pretty consistent level of mistrust, which all things considered is fair.) We love them because they're adorable and delicious. We hate them because they overbrowse the forest, and in some cases, radically alter its composition. Bambi's mom, gracefully browsing clover in the summer months, becomes The Red Queen each winter as she beheads all the desirable regeneration on your woodlot. If only there was something you could do.

ELI SAGOR

Well, maybe there is. Meet the budcap, a simple tool that's used extensively in the north-central parts of the country. The idea is that if you wrap a piece of paper around the terminal leader and bud of a tree, a browsing deer can't get to it. You do this in the late fall, before snow covers the ground. Just fold a 4" x 6" piece around the tree's leader to form a sleeve, then staple the paper together at least three times, catching some needles as you go. Come spring the budcaps just fall off on their own. Reapply them each fall until the tree is out of reach of deer.

We asked our friend Eli Sagor, an extension educator at the University of Minnesota, about the practice, and he said that it's widely used in the state's wood basket, and that 10 different landowners will use 10 different materials. The latest rage is to use raw wool. Sagor says that it's not a fool proof cure – in some cases the deer will nip off the leader below the budcap – but in all, it's effective. He said it's used mostly in pine plantations.

In theory, this works better with conifers than hardwoods, because needles help hold the budcap on and because hardwood buds become especially succulent in spring, when budcaps start to fail. Nevertheless, some hardwood bud-capping does go on and the results have been encouraging. Word is that balloons make a good medium for oak.

Why isn't this used more back east? It has to do with differences in silviculture. In the north-central states, it's standard practice to replant stands, and since pine seedlings from a nursery are especially nutrient rich, the deer target them over native seedlings. But this isn't to say that it won't work here. If you're micromanaging a stand in an area that experiences heavy deer browse, or looking for an easy way to discourage the deer on the dozen Christmas trees you're nurturing out back, why not experiment and see if this helps. A dollar or two worth of paper and staples is a lot cheaper than a fence. NW

[THE OUTSIDE STORY]

The Touchy-Feely World of Whiskers

Of the many questions one is left with after listening to the nursery rhyme *Three Blind Mice*, none is more vexing than how three blind rodents were able to chase anything, let alone a farmer's wife. As the three mice in question died in 1805, we'll probably never know the full answer. There are some clues in the scientific record, though. The fact is, mice and other nocturnal rodents can take in sophisticated three-dimensional information about their surroundings without using their eyes.

Rodent eyes don't function like our eyes. Ours are on the front of our heads and we see in stereo; their eyes are on the sides of their heads and their field of vision doesn't overlap. Our eyes always move together; a rodent's eyes can move in opposite directions. If a rat points its snout downward, its eyes look up, rather than where its nose is pointing. If its head tilts down to the right, the right eye looks up while the left eye looks down.

There is a purpose to these odd movements – to keep the space above in view at all times. To a rodent, constant scanning overhead for birds of prey is more important for survival than clearly seeing the path ahead.

So how do rats sense what's in front of their noses? Instead of relying on sight, they pass their whiskers over all surfaces, repeatedly, from different angles to get three-dimensional images of their surroundings. This process, called whisking, occurs constantly and rapidly – up to 12 times per second, among the fastest movements measured in mammals. Each whisker has its own muscle and can move independently. There are also muscle arrays that move all the whiskers together.

If you were to examine a rat's face, you would see that it has two different varieties of facial hair: long stiff whiskers that stick out around the snout and above the eyes, and shorter, finer whiskers below the nostrils that point down. The whiskers are arranged in a defined grid pattern. If you could peer into the rat's head, you would discover that each whisker is connected to a discrete bundle of brain cells. These bundles are arranged in exactly the same grid pattern as the whiskers to which they are connected. This organization of sensors provides the rat with a detailed snapshot of the space in front of it.

Whiskers themselves are not living tissue. Their exquisite sensitivity lies at the base, in the follicle where the whisker sprouts from the skin. When a whisker touches a surface, it bends. The tension from bending is sensed by nerves in the follicle that send a signal to the brain.

While the bending of whiskers transmits spatial information, the sensitivity of whiskers to vibration allows the rat to feel differences in texture with astonishing accuracy. Whiskers are far more sensitive than the human fingertip – for instance, a rat can tell the difference between a totally smooth surface and one scored with microscopic grooves 30 microns deep (a micron being one thousandth of a millimeter).

Different whiskers resonate with different frequencies. The thicker, longer whiskers away from the nose vibrate at lower frequencies, while the shorter, finer whiskers closer to the nose respond to higher frequencies. Like strings on a piano, the whiskers form an orderly array of filaments tuned to a gradation of sounds, or vibrations, from low to high. It is also likely that whiskers sense air currents in burrows and narrow spaces for additional directional clues.

ADELAIDE TYROL

Whiskers, of course, do not operate in isolation. The rat senses its environment through hearing and smell, too. In fact, whisking and smelling, or sniffing, are locked into the same rhythm, so that every time a rat whisks it also sniffs. Thus shape, texture, and smell are transmitted simultaneously to the brain.

All of which is to say that three blind mice, rats, or other whisking creatures wouldn't be nearly as helpless as one might expect. Although out in the open they might be easy prey for a hawk, or the farmer's wife, in other contexts they could navigate well without sight. For a life often lived in shadows, scurrying beneath vegetation and navigating burrows, the touchy-feely sense of whisking offers a rich way to see that isn't just dependent on vision.

Li Shen

Viable nut on left; unpollinated ghost nut at right.

[BOTANY]

Ghost Nuts

As you read this, black bears in Northern New England are lumbering towards their winter dens, their bodies rolling with beechnut fat. Or not. If there weren't any beech nuts in a given area, the skinny bears may already be hibernating. In this case, the females may abort their embryos as they hibernate, their bodies just not up to the task of giving birth.

There were reports of a modest beech nut crop this fall in much of the Northeast, but if you looked closely, you may have noticed a lot of aborted beech nuts – that is, nuts that looked to all the world like actual beech nuts, but on closer inspection were nothing but nut-shaped husks.

We asked beech expert Dave Houston about these fake nuts, and he confirmed that these were nuts that never got pollinated. Beech flowers in early May and is wind pollinated, which leaves it susceptible to the vagaries of spring weather. A lot of rain might mean a bad pollination year. Plus, the tree has relatively heavy pollen that doesn't disperse particularly well, which might mean that dense stands of beech will have more pollinated nuts than individual beech trees growing amidst other hardwoods. On any mast year, there will be a mix of pollinated and unpollinated nuts, though pollination rates vary widely.

Why would a tree put energy into making a fake nut? Tom Vogelmann, plant physiologist at UVM, says that the empty husks are made of carbon, which is a relatively cheap commodity to a tree. The actual nut is the expensive item, as it uses up precious nitrogen to make protein. Since it doesn't take that much effort to make an empty nut, maybe the answer is that, like a bear, going part way gives the tree the ability to gauge its health and make a last-minute decision whether or not to make (a couple thousand) babies. NW

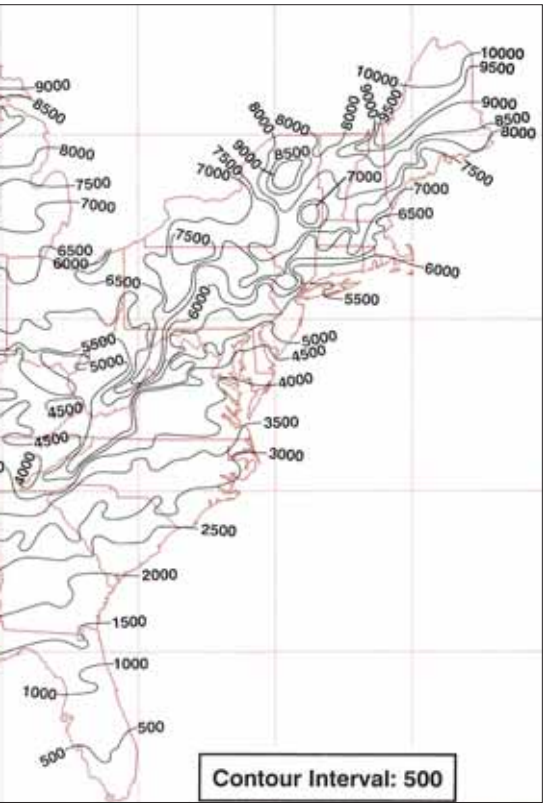
[SKILLS]

How Many Cords of Firewood Do You Need?

Although I was born and raised in New England, my wood-burning experience comes from 40 years living in the heart of Alaska. I retired after 38 years of teaching forestry at the University of Alaska Fairbanks and now split my time between playing with my grandchildren and filling my Passive Solar Biomass Dehydrator (woodshed) while my wife operates the electric Solid Cylindrical Cellulose Separator (wood splitter). Recently, my daughter and her family settled in New England, and periodic visits have rekindled my love of the Northeastern forest. Last spring, I observed several stacks of wood in people's yards and thought it would be fun to create a guide for estimating how many cords of wood one would need to heat a home in New England or New York.

While there are many factors that go into answering that question, my guide will concentrate on three universal elements: the climate, the house, and the wood. Readers can adjust the tabulated values as they see fit.

Annual Heating Degree Days
Based on 1961–1990



The Climate

The handiest index of climate in a given area is the average annual heating degree days (HDD). While meteorologists use complex algorithms to establish these numbers, a simple, accurate enough way to do it is to determine the average temperature of a day (If the high were 40 and the low 20, your average temperature would be 30), then subtract this number from 65, the standard base temperature of a building. Add up a year's worth of these numbers and you have your annual HDD. You'll see we saved you from doing the math and ran a map.

The House

Two factors are important: how tight and how big. The Home Heating Index (HHI) is a useful, yet relatively simple, index of how tight (or more aptly, how leaky) your house is. HHI values range from 1 (you live in an air-tight box) to more than 23 (you live in a canvas tent), based on BTUs per square foot per HDD. Average residential energy consumption in New England is approximately 110,000,000 BTUs a year. (2,232 square feet is considered an average house.) Assuming a heating system efficiency of 85 percent, one can estimate the HHI score for a typical New England home to be about 6 BTUs per square foot per HDD.

The Wood

Finally, we come to the wood. Here's where I have to confess to wood envy when I visit the Northeast. There are so many species of high-energy hardwoods in comparison to interior Alaska, I'm like a kid in a candy store. Regrettably, my carry-on bag just won't hold very much.

In order to handle the abundance and diversity of species in New England and New York, I've created three species groups, based on specific gravities (oven-dried weight per green cubic foot). Wood 1 uses the average of the specific gravities of hickory and eastern hornbeam (0.64); Wood 2 uses the average of the specific gravities of beech, oak, and maple (0.57); and Wood 3 uses the average of the specific gravities of red maple and paper birch (0.48). The recoverable heat from wood depends on how many pounds of wood there are in a stacked cord (128 cubic feet of space), and how much water each pound of firewood contains. If you have a pound of firewood at 50 percent moisture content, then you have only a half-pound of fuel. Plus, it takes a load of energy (970 BTUs per pound) to heat up that water and evaporate it – energy that could be heating your house. The guideline for seasoned firewood is generally taken at 20 percent moisture content, and that is the moisture content assumed here. With these assumptions, Wood 1 contains 26,791,545 BTUs per cord, Wood 2 contains 23,785,395 BTUs per cord, and Wood 3 has 19,994,885 BTUs per cord.

Newer wood stoves have efficiency ratings around 90 percent. I assume a wood stove efficiency rating of 80 percent in the chart, which is characteristic of an older airtight wood stove. If you know your stove to be more or less efficient than 80 percent, you can adjust the number of cords accordingly (cords of wood x 80 / actual stove efficiency).

Putting it all together

The chart on the next page contains general categories for the climate index, the house index, and the wood group. You can tweak the values given in the chart to fit your specifics since all variables with the exception of wood moisture content have a linear effect on the results. You can also account for your own personal habits. For instance, suppose you only burn wood from November through March. All you need to do is estimate the HDD for that period of the year and use the closest HDD heading in the chart. The moisture content assumption is not easily adjusted. Overall, if your wood is drier than 20 percent, the amount of wood needed is probably on the high side. That's a good thing! When I ask people in Alaska how many cords of firewood they need, the response is often "two more than I've got!"

Whatever your wood burning habits, I hope this information helps you stack enough wood for a warm and cozy home this winter. I would appreciate any feedback that seasoned wood burners might offer on the usefulness and accuracy of the chart.

John Fox

Cords of Firewood Needed – New England & NY

HOUSE		CLIMATE														
		9000 Annual HDD			8000 Annual HDD			7000 Annual HDD			6000 Annual HDD			5000 Annual HDD		
HOME HEATING INDEX	SQ FT	WOOD 1	WOOD 2	WOOD 3	WOOD 1	WOOD 2	WOOD 3	WOOD 1	WOOD 2	WOOD 3	WOOD 1	WOOD 2	WOOD 3	WOOD 1	WOOD 2	WOOD 3
2 BTUs per sq. ft. per heating degree-day	1000	0.8	0.9	1.1	0.7	0.8	1.0	0.7	0.7	0.9	0.6	0.6	0.8	0.5	0.5	0.6
	1500	1.3	1.4	1.7	1.1	1.3	1.5	1.0	1.1	1.3	0.8	0.9	1.1	0.7	0.8	0.9
	2000	1.7	1.9	2.3	1.5	1.7	2.0	1.3	1.5	1.8	1.1	1.3	1.5	0.9	1.1	1.3
	2500	2.1	2.4	2.8	1.9	2.1	2.5	1.6	1.8	2.2	1.4	1.6	1.9	1.2	1.3	1.6
	3000	2.5	2.8	3.4	2.2	2.5	3.0	2.0	2.2	2.6	1.7	1.9	2.3	1.4	1.6	1.9
	3500	2.9	3.3	3.9	2.6	2.9	3.5	2.3	2.6	3.1	2.0	2.2	2.6	1.6	1.8	2.2
	4000	3.4	3.8	4.5	3.0	3.4	4.0	2.6	2.9	3.5	2.2	2.5	3.0	1.9	2.1	2.5
4 BTUs per sq. ft. per heating degree-day	1000	1.7	1.9	2.3	1.5	1.7	2.0	1.3	1.5	1.8	1.1	1.3	1.5	0.9	1.1	1.3
	1500	2.5	2.8	3.4	2.2	2.5	3.0	2.0	2.2	2.6	1.7	1.9	2.3	1.4	1.6	1.9
	2000	3.4	3.8	4.5	3.0	3.4	4.0	2.6	2.9	3.5	2.2	2.5	3.0	1.9	2.1	2.5
	2500	4.2	4.7	5.6	3.7	4.2	5.0	3.3	3.7	4.4	2.8	3.2	3.8	2.3	2.6	3.1
	3000	5.0	5.7	6.8	4.5	5.0	6.0	3.9	4.4	5.3	3.4	3.8	4.5	2.8	3.2	3.8
	3500	5.9	6.6	7.9	5.2	5.9	7.0	4.6	5.2	6.1	3.9	4.4	5.3	3.3	3.7	4.4
	4000	6.7	7.6	9.0	6.0	6.7	8.0	5.2	5.9	7.0	4.5	5.0	6.0	3.7	4.2	5.0
6 BTUs per sq. ft. per heating degree-day	1000	2.5	2.8	3.4	2.2	2.5	3.0	2.0	2.2	2.6	1.7	1.9	2.3	1.4	1.6	1.9
	1500	3.8	4.3	5.1	3.4	3.8	4.5	2.9	3.3	3.9	2.5	2.8	3.4	2.1	2.4	2.8
	2000	5.0	5.7	6.8	4.5	5.0	6.0	3.9	4.4	5.3	3.4	3.8	4.5	2.8	3.2	3.8
	2500	6.3	7.1	8.5	5.6	6.3	7.5	4.9	5.5	6.6	4.2	4.7	5.6	3.5	3.9	4.7
	3000	7.6	8.5	10.2	6.7	7.6	9.0	5.9	6.6	7.9	5.0	5.7	6.8	4.2	4.7	5.6
	3500	8.8	9.9	11.8	7.8	8.8	10.5	6.9	7.7	9.2	5.9	6.6	7.9	4.9	5.5	6.6
	4000	10.1	11.4	13.5	9.0	10.1	12.0	7.8	8.8	10.5	6.7	7.6	9.0	5.6	6.3	7.5
8 BTUs per sq. ft. per heating degree-day	1000	3.4	3.8	4.5	3.0	3.4	4.0	2.6	2.9	3.5	2.2	2.5	3.0	1.9	2.1	2.5
	1500	5.0	5.7	6.8	4.5	5.0	6.0	3.9	4.4	5.3	3.4	3.8	4.5	2.8	3.2	3.8
	2000	6.7	7.6	9.0	6.0	6.7	8.0	5.2	5.9	7.0	4.5	5.0	6.0	3.7	4.2	5.0
	2500	8.4	9.5	11.3	7.5	8.4	10.0	6.5	7.4	8.8	5.6	6.3	7.5	4.7	5.3	6.3
	3000	10.1	11.4	13.5	9.0	10.1	12.0	7.8	8.8	10.5	6.7	7.6	9.0	5.6	6.3	7.5
	3500	11.8	13.2	15.8	10.5	11.8	14.0	9.1	10.3	12.3	7.8	8.8	10.5	6.5	7.4	8.8
	4000	13.4	15.1	18.0	11.9	13.5	16.0	10.5	11.8	14.0	9.0	10.1	12.0	7.5	8.4	10.0
10 BTUs per sq. ft. per heating degree-day	1000	4.2	4.7	5.6	3.7	4.2	5.0	3.3	3.7	4.4	2.8	3.2	3.8	2.3	2.6	3.1
	1500	6.3	7.1	8.5	5.6	6.3	7.5	4.9	5.5	6.6	4.2	4.7	5.6	3.5	3.9	4.7
	2000	8.4	9.5	11.3	7.5	8.4	10.0	6.5	7.4	8.8	5.6	6.3	7.5	4.7	5.3	6.3
	2500	10.5	11.8	14.1	9.3	10.5	12.5	8.2	9.2	11.0	7.0	7.9	9.4	5.8	6.6	7.8
	3000	12.6	14.2	16.9	11.2	12.6	15.0	9.8	11.0	13.2	8.4	9.5	11.3	7.0	7.9	9.4
	3500	14.7	16.6	19.7	13.1	14.7	17.5	11.4	12.9	15.4	9.8	11.0	13.2	8.2	9.2	11.0
	4000	16.8	18.9	22.6	14.9	16.8	20.1	13.1	14.7	17.5	11.2	12.6	15.0	9.3	10.5	12.5

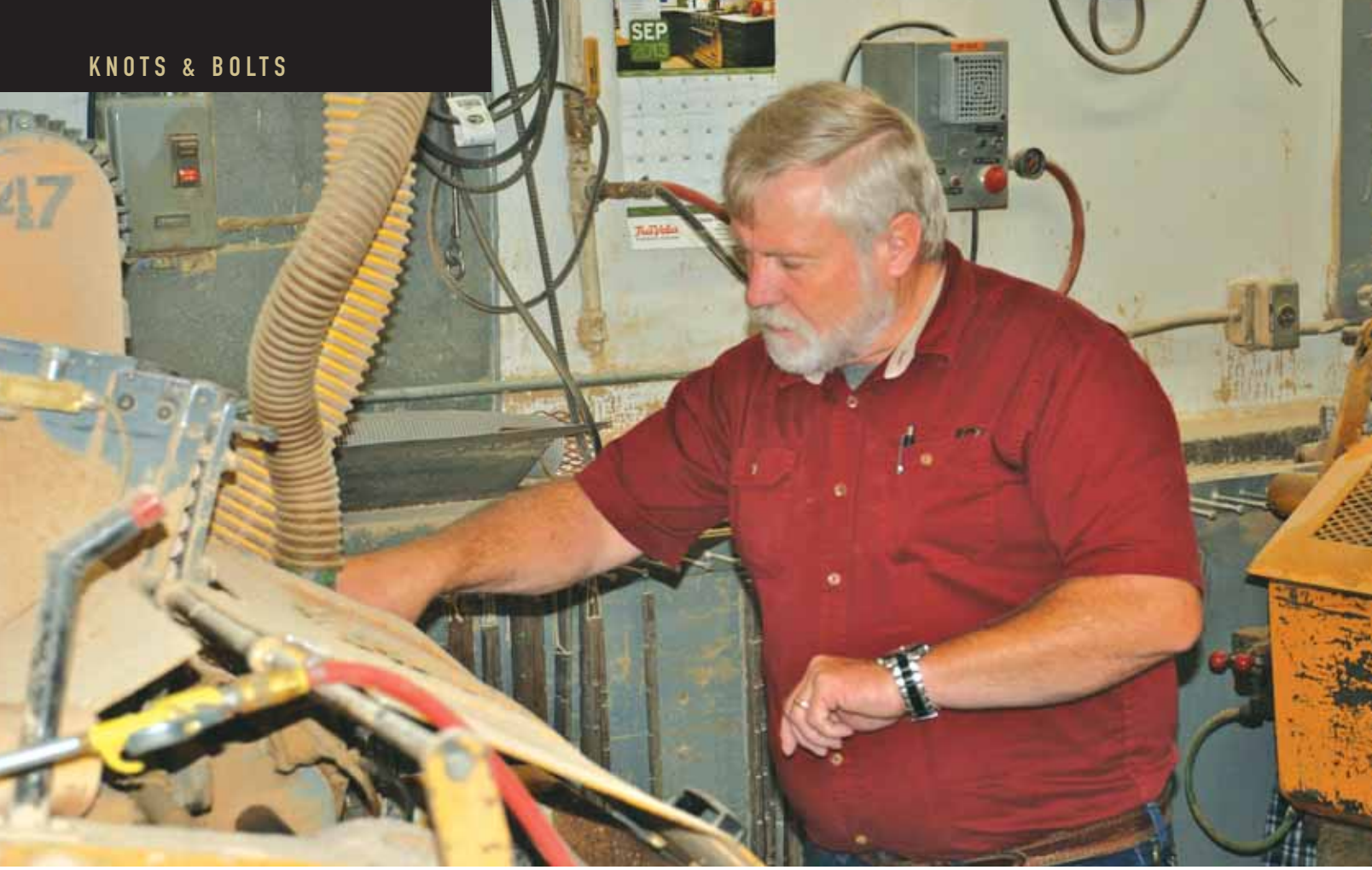
The Home Heating Index (HHI)

HHI = (heating system efficiency x # units of fuel used/yr x BTUs/unit) divided by (heated ft2 x HDD/yr)
Example for oil @ 138,690 BTU's/gallon, in Hanover, NH, 2000 sq. ft., 503 gallons of fuel oil/yr, 0.85 efficiency

HHI = ~4

HHI Score (BTU/ft2/HDD)		**Description**
2 x 6 walls or better	>0 to 2	Air tight, super insulated, 90+ heating efficiency, heat-recovery ventilation, small window area, and high window R-value.
	>2 to 4	Well insulated, low air leakage, efficient heating systems. Homes labeled Super Good Cents in U.S. or R-2000 in Canada.
	>4 to 8	Better than average homes with good insulation, relatively low air leakage, and better than average heating efficiency.
2 x 4 walls	>8 to 13	Average home with average insulation, average air leakage; average heating efficiency.
	>13 to 18	Worse than average homes with little insulation, high air leakage, and worse than average heating efficiency.

**adapted from: Krigger, J. and C. Dorsi. 2009. Residential Energy. Prentice-Hall. (designed for homes heated with fossil fuels)*



[MANUFACTURING]

Last Man Standing

You could easily breeze past the nondescript Maine Wood Concepts mill in the tiny town of New Vineyard without realizing it's there. Inside, however, it's very much alive, with more than a hundred workers manning rows of woodturning machines that churn out untold quantities of wooden items.

The Fletcher family has operated the mill since 1971, when brothers Wayne and Earl Fletcher bought it from former owner, Percy L. Webber. At that time, it was one of many turneries in the Pine Tree State. Four decades later, it's one of a handful left in the entire country. And it's not only surviving, but growing. The company recently bought the Vic Firth Company's line of upscale gourmet kitchen products and rebranded it as Fletchers' Mill. In August, the mill received the Pine Tree Award from the Maine Wood Products Association for contributions to innovation in the forest products economy.

Recently, Maine writer Joe Rankin sat down with MWC's president, Douglas Fletcher, to talk about the company.

Above: Fletcher timing a machine's output.
Below: Wooden nickel blanks.

Tell us a little about what you make.

As our slogan says, "We turn wood into what you need!" That's anything from a wooden nickel to molded nativity scene pieces to Lufkin Rule laths. We make rolling pins, muddlers, salt and pepper mills, chopsticks, spatula handles, honey dippers, kendamas, duck calls, gavels, wooden game pieces, furniture buttons and plugs, balls and beads of every size and shape up to three inches in diameter. We make toy train parts – smokestacks and wheels – Christmas tree ornaments, yo-yos, spindles, hairpins, recipe card holders, candlesticks. The list goes on and on. Since 1971, we've probably made close to a million different items, if you call every different size and shape of wheel or spindle a different item.

What woods do you use and where do you source them?
We use mostly birch and rock maple. We opened our sawmill in 1973. Most of our wood comes from within a 75-mile radius. When we branched out into the Fletchers' Mill line we had to go out farther. Part of it is size and quality. We've been used to buying the equivalent of pallet-grade logs and sawing them into squares for smaller turnings. But it takes a very high quality log to produce the items in the Fletchers' Mill line – salt and pepper mills and rolling pins. You can't get that out of a pallet log.

You've made a practice of buying other companies or their product lines. How did that strategy evolve? Did it strengthen your business?
The first company we bought was a machine shop in Massachusetts that made tooling for our machinery. We sold it in early 2005. We bought the Lutz File and Tool Co. in 2005 and Pride Manufacturing's custom wood turning division in Guilford, Maine in 2005. Then the spatula handle line from Downeast Woodcraft in Anson, then the Vic Firth line. With Vic Firth, we recognized the opportunity to have a finished product we could sell at retail, versus making components where there is so much competition. We have no plans to discontinue our component manufacturing, but with Fletchers' Mill we believe we've tapped into a business that has an opportunity for substantial growth.

The wood turning sector in the northeastern U.S. was hard hit by the rise of manufacturing in China. What was your experience?
It was rough on us. We bought American Pride in 2005, which significantly expanded our horizons. We began doing small turnings, small molded pieces and shapes, cribbage pegs. But between 2007 and 2009 both businesses were struggling. Those were very hard years. Even customers that continued to buy from us, who didn't go to China, were beating us down on our prices. In 2009, we closed our facility in Guilford and merged it into the business here in New Vineyard. We did it because we needed to in order to survive, but it was probably the best thing that could have happened. We had to examine all areas of our operation and become more efficient.

Some see manufacturing returning to the U.S. How do you see that playing out?
We have already brought back the lion's share of what we lost. Some of it is because of economic factors – rising labor rates in China, customers' need for quick turnaround, the cost of shipping, even cultural differences and the time difference. There are so many challenges to manufacturing in China.

You have a reputation for running a lean operation. What does that mean?
Lean is a systematic process and business philosophy that minimizes waste, including time, motion, excessive inventory from over production, and processing data. We're not practicing Lean as well as we could be, but we're better than we were 10 years ago. Some of that is because of the way that we recover value of materials – we've come up with revenue streams where it used to cost us to get rid of material. We heat all of our manufacturing facilities and dry kilns with the wood chips from our turnings. These days we're much more cell-oriented. At the sawmill, there's one guy doing four different operations. But when it comes to work flow, sometimes it's difficult. In an ideal plant, the work would start on the top floor and go down. This mill was pieced together and grew over time – it was originally a blacksmith shop. Sometimes it's hard to arrange a logical flow to the work, especially given that we're making so many different products and our product mix has changed so much.

How much has technology helped?
In the wood turning business we're new school and old school. The CNC machines at the sawmill are about as high tech as we get. Yet the lathe that makes toy tractor trailer tires has been around since the '20s. But you'd be hard pressed to go over there and find a single machine that's the same as when it was first built. Our machinists have made many modifications to our equipment to make it do what we want it to do. The biggest changes have taken place in our boiler and our air compressor. Before 2008, we had to have three air compressors to run the mill. Now we have one, and that one only puts out the horsepower needed at any particular time.

Rebranding the Vic Firth line was a big step. How's that working out?
The rebranding itself wasn't difficult. Probably the most difficult thing was coming up with a name. It was simple in the end – Fletchers' Mill, with the apostrophe on the end signifying more than one Fletcher. My father and uncle started the business and now there are three brothers who are current owners and a fourth brother who also works here. When we bought Vic Firth, the national sales manager opted to come with us. If he hadn't, we would not have proceeded. He knew the customers, the reps, the business. We were not in a position to have done that ourselves.

Talk a little about your staffing situation. Do you have trouble finding qualified workers?
You do when you need 30 overnight. We knew it was going to take a number of additional employees to integrate Fletchers' Mill while still maintaining production of traditional custom turnings. Fortunately for us, we'd been working with the Regional Wood Products Consortium for over a year in an attempt to develop growth strategies. That proved to be very timely and beneficial for us. Last year we had around 75 employees; we have 108 now. Quite honestly, we couldn't have managed this expansion without them. In addition, I think we're at the place where we need to expand our machine shop and expand our research and development capabilities. I anticipate that being fully staffed is going to about 115 employees. If the people we need were available, we'd hire them today.

Joe Rankin

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Lost Histories

The Story of New England's Stone Chambers

BEN LORD

By Benjamin Lord

In the frosty, pre-dawn darkness, three friends and I pulled off on a lonely stretch of road in Windham County, Vermont. The aging Subaru had bumped and heaved over the frozen ruts. We emerged, grateful to have our feet back on solid ground, and stumbled through the woods until we found what we were seeking – a mysterious stone chamber set into the hillside like a passage to an underground world, its dark opening constructed of massive stones. Exchanging silent glances, we crawled through the narrow door. There was barely room for the four of us. The ceiling was no more than three feet high. The ground beneath us was frozen. We doused our headlamps and waited in the darkness.

Shortly after we settled, the sun rose over the horizon. A beam of light shot through the entrance to illuminate an unusual stone in the back of the chamber and the cramped space filled with a fiery glow. We had hoped that this might happen, but the hope did nothing to diminish our surprise, wonder, and, at least on my part, a sense of reverence. Nor did it do anything to alleviate my curiosity. Who had built this strange underground room that lit up with sunlight on this particular morning? And for what purpose?

When we visited that stone chamber on the vernal equinox of 2008, I was unaware of the scope of the mystery I had stumbled upon. But as I shared the story, I learned from my neighbors that this unusual stone room was not the only one of its kind. The forests of New England are littered with stone relics. Best known, of course, are the stone walls and cellar holes of nineteenth-century settlements. But among them are stone structures with origins that are harder to explain: underground chambers, stones set on end to stand like pillars, massive cairns.

The neighbor who introduced me to the chamber I visited called it the Pig Pen and told me that early farmers had built it to contain swine. That same neighbor led me to another underground room, which was invisible until he moved a pile of stones and lowered himself through a hole into the darkness below. It was constructed of un-mortared stones, the shape of a subterranean beehive. Spacious enough for several adults to stand in, the chamber smelled musty and felt mysterious and ancient. Local lore has attributed a tidy explanation: It was called the Slave Pit, a presumed stop for escaped slaves traveling the Underground Railroad on their way to Canada.

But after watching the equinox sunrise light up the Pig Pen, I began to question these stories. Why would settlers have invested such enormous effort and moved such massive stones (some of which must have weighed over a ton) to put a roof over swine? Why did they gouge a groove over an inch deep into the bedrock that comprised the doorsill? Was it coincidence that the Pig Pen is positioned to capture the sun as it rises over Mount Monadnock on the morning of the winter solstice? Perhaps there was more to the story than my neighbors knew.

Piles of stone

Not far from the summit of Glastenbury Mountain in Southwestern Vermont, the Long Trail passes by an old fire tower. A series of low stone mounds lie nearby. Five in number, they stand two to four feet high and nearly eight feet in diameter. It is not unusual to see piles of stone in New England. Farmers left them wherever they settled to make way for construction or cultivation. But these strange and carefully crafted cairns stand on a remote mountain top that's miles from any colonial cellar hole.

Mountain travelers have long used stone cairns on open summits to serve as guides when visibility is low, and it would be reasonable to assume that trailblazers built the cairns. At least, it would be reasonable if Glastenbury had an open summit. But the mountain is completely wooded, as it was when the first major trail was cut to its summit in the early 1900s.

Most trail-marking cairns are built as tall stacks or cones to make them easy to find during stormy days, but the Glastenbury structures are barrel shaped, wide and low. Most cairns are built from small stones that are easy to move, but the Glastenbury cairns are built from boulders, some weighing hundreds of pounds.

The unusual nature of the cairns caught the eye of Norman Muller, Conservator of the Princeton University Art Museum, who has studied stone structures throughout the eastern United States. Muller had seen a similar site in Windsor County, Vermont, with over 100 cairns. He had long suspected that they might have prehistoric origins, but they stood amid the ruins of old Vermont farms. Might the Glastenbury cairns, isolated as they were, offer some clues to their antiquity?

To find out, Muller enlisted the help of Tom Wessels, author of *Reading the Forested Landscape*, and they visited Glastenbury during the summer of 2007. They mapped and measured the mounds and observed the surrounding forests. They measured the depth to which forest debris and soil had accumulated. They noted the thick layer of moss covering the rocks, suggesting that the stone structures might be far older than the mountain's trails. Wessels concluded that the structures were "much older than 200 years," even that they pre-dated European settlement in the region. Wessels wrote, "Those cairns obviously have nothing to do with agriculture. They clearly predate the fire tower and original hiking shelter, based on their moss development."

"The evidence from the Glastenbury cairns," says Muller, "strongly suggests they were constructed by Native Americans." But according to both oral history and the archaeological record, precontact Native American settlement in southern

Vermont centered on the shores of rivers and lakes. The nearest navigable waterways to Glastenbury are a dozen miles away over rugged terrain. Perhaps the structures served some ritual or religious function, but there are no records of the region's Native populations creating similar structures.

However, this does not mean that there aren't analogues out there. David Lacy, an archaeologist with the Green Mountain National Forest, suggests looking at similar stone structures a bit farther afield. "There are (not identical but perhaps comparable) stone works in the Appalachians to the south." Archaeologist Harry Holstein of Jacksonville State University has excavated these cairns in larger numbers, and found that while some are ambiguous, some are clearly prehistoric.

When I asked Lacy what he thought about the origin of Vermont's unusual cairns, he pointed to the need for more data. "There are some cynics out there who say, 'We know what they are. They're nineteenth century.' And I'm inclined to think that that's true. But when you look at what Harry's demonstrated in the southern Appalachians – that a proportion of the ones he's excavated actually have Native material in them – there is a case to be made that these are Native."

Ancient mariners

Bart Johnston's backyard in rural Chittenden County, Vermont, affords an incredible view of Mount Mansfield. On the fine summer day that I visited, Johnston asked me to consider a third possibility – that ancient European mariners were the ones who built these hard-to-explain stone structures. As we walked through the woods behind his home, he pointed out impressive dry-masonry structures with unusual features. The stones were enormous. The largest ones must have weighed several tons each. And they were all meticulously oriented 22° north of east. When we came upon a particularly massive and beautifully crafted stack of stones, he stated passionately, "A bunch of hardscrabble, backwoods farmers did not build this." Nor did Native American builders, Johnston believes. "I think they're Celts."

Johnston's theory is that thousands of years ago New England was home to groups of ancient Celtic peoples who crossed the Atlantic from Europe, and that the structures near his home represent an ancient ritual site. Johnston is not alone in this belief. In our tour of his property, we were joined by spirited members of the New England Antiquities Research Association (NEARA), an organization dedicated to researching unusual stone sites. Across the Northeast, this community of enthusiasts, intrigued by sites like the one at Johnston's property, have joined together to identify, document, and try to explain them. Many NEARA members vigorously support the idea that these structures are evidence of pre-Columbian settlers from ancient Europe.

At the heart of this controversial idea is the largest and most impressive stone site in New England – Mystery Hill, in Salem, New Hampshire, also known as America's Stonehenge. Of all the hundreds of stone ruins across New England, none has garnered more attention. A complex of chambers, walls, and standing stones, this site has attracted visitors for over a century.

I asked Dennis Stone, whose family has owned and managed the site as a museum since the 1950s, who he thought built the structures at Mystery Hill. "It's not conclusive," he said, "but we think that the site and other sites in New England suggest Old World visitation to the New World from the Mediterranean Sea and the Iberian Peninsula." He states that an excavation at one of the America's Stonehenge chambers unearthed charcoal that was radiocarbon dated to about 4,000 years ago, that a number of stone tools were found there, and that the stones of the chambers were quarried without metal tools, using Stone Age techniques. There are striking similarities with structures in the Old World. "The size, shape, and orientation of these structures look very much like what's on the other side of the ocean," he said.

Then there are the unusual astronomical alignments. Inspired by the other Stonehenge (in England), the Stone family began clearing around the large, arrow-shaped, vertical stones at Mystery Hill to find out if, perhaps, they had some astronomical purpose. By 1973, they'd discovered a number of astronomical alignments, and by 1977, they had surveyed so many that they felt that there must be some significance. Various stones through the site could be used to observe the movements of the sun on the solstices, equinoxes, and the cross-quarter days that fall midway between them. Others marked the lunar standstill and the passage of the moon through its 18.6 year cycle. There were 24 different star alignments. "I don't think they're coincidental," Dennis told me. "You can only have so many before it becomes something you have to assume was set up deliberately."

And Mystery Hill isn't the only site with these kinds of alignments. In Massachusetts, Byron Dix and Jim Mavor have carefully documented the alignment of stone chambers that observe the rise of the Pleiades over distant cairns. "The odds against random location," they concluded, "and therefore favoring purposeful design for astronomical purposes are considerably greater than one million to one."

But astronomical alignments are not the strangest of the mysteries that Stone describes. He also tells of two triangular stones excavated at Mystery Hill and inscribed with text-like markings. These stones sat in America's Stonehenge's museum with no explanation until Barry Fell, of Harvard University, visited the site in 1975. Fell, a translator of ancient inscriptions, took an interest in the stone tablets. "His conclusion," Stone told me, "was that one [of the inscriptions] was Libyan. But it was difficult to make out what the inscription said. Part of it was pretty weathered. It looked like it was partly missing. The other was identified as being Iberian Punic or Phoenician. It said the structure was supposed to be dedicated to Baal on behalf of the Canaanites."

A marine biologist by profession, Barry Fell is best known for his book, *America B.C.: Ancient Settlers in the New World*, which popularized the idea that ancient mariners crossed the Atlantic Ocean to trade, explore, and settle in the Americas. Fell claimed to have translated inscriptions found across eastern North America, which showed that Iberian Celts had settled New England 3,000 years ago. Here they founded a kingdom named Iargalon, and settlements supposedly continued until the

early days of the Roman Empire. Phoenician and Egyptian traders were said to have made regular visits to the American coast and intermarried with Native people to become the Wabanaki of northern New England and the Maritimes. He even claimed to have found inscriptions showing that Egyptians and Libyans penetrated the Mississippi River watershed as far as Iowa, the Dakotas, and Arkansas.

Curiouser and curiouser

As my investigations continued, I came to feel that unpuzzling the mystery of New England's stone structures was like stepping through the looking glass; each new chapter was curiouser than the last. Each new site brought its own idiosyncrasies. Each new person had his or her own story. There were so many claims and so much purported evidence that it was daunting to imagine sifting through it all.

I sought a critical perspective to help sort genuine evidence from wishful thinking, and found it in Giovanna Peebles, Vermont's State Archaeologist. Peebles has spent years researching these stone chambers and documented her findings in her exhaustively footnoted book *Vermont's Stone Chambers: An Inquiry into Their Past*.

When Peebles signed on as Vermont's state archaeologist in July of 1976, the buzz about New England's stone chambers had reached its apogee. If these structures really were what people claimed, then they would be among Vermont's top priorities for historic preservation. People were asking the state to investigate. And Peebles, as state archaeologist, was assigned to the investigation. "It was 110 perecnt of my time." With the help of a federal grant, Peebles and two researchers examined every chamber, scrutinized the deeds for every parcel of land they were found on, scoured the history of each town where these chambers existed, and pored over century-old agricultural publications. And at the end of it, Peebles came away quite convinced that she had answered the questions that she had been charged with. "While there are still many archaeological puzzles in Vermont," she concluded, "the stone chambers are not among them."

The most telling clue was one she never found: the historical record contains no mention of chambers at all. Early European explorers, charged to record these new lands in detail, said nothing of them. Neither did early surveys or deeds. Wouldn't a stone structure be the kind of feature that they would take pains to describe? Wouldn't the discovery of a subterranean room by early farmers have garnered at least an intriguing footnote in the histories? Unless, of course, the stone chambers weren't there to be found.

But what of the enormous size of the stones? "One of the polemics," said Peebles, "is, 'Well, Vermont farmers couldn't lift these hundred-ton stones.'" But over the course of her research, she found example after example that showed that not only could colonial Vermonters move stones like this, they did it on a regular basis. "There are villages in New Hampshire where half the buildings were moved more than once…. People were moving hundred-ton structures almost daily." The landscape of nineteenth century New England was one where the stone

BENJAMIN LORD

From top: stonework on the Johnson property; a stone chamber in Putnam County, New York; Pig Pen, front view.

LARRY MULLIGAN

BENJAMIN LORD

chambers would seem quite at home. Indeed, upon close inspection, the style and structure of many of the stone chambers closely matched the masonry in the remains of nearby farmsteads.

It is true that the New England chambers bear a striking similarity to some ancient Celtic structures in Europe. But Peebles points out that similarities of this kind don't always imply a cultural connection. Often they result from people in similar landscapes with similar materials trying to solve similar problems. Still, context is important, so Peebles tracked down similar structures wherever she could find them. She stumbled upon nearly identical stone chambers in Iceland, all of them used as root cellars. On a tip from the cultural historian Eric Sloane, she researched farms in Pennsylvania, where she found beautifully illustrated records of historical root cellars. "And they looked just like our stone chambers."

But if New England's stone chambers were colonial structures, what of the thousands of inscriptions discovered by Barry Fell? Fell's work was rejected by the archaeological community. Even as a lay reader it is easy to see why. He drew sweeping conclusions from the inscriptions that he found. He eschewed peer review and instead released his ideas in popular works and through an organization of fellow believers that he founded called the Epigraphic Society. Many of his inscriptions appear to be little more than scrapings on stones that could have pedestrian explanations. And his translations remain uncorroborated by other experts. When Anne Ross, a British authority on Celtic Ogam script, inspected some purported inscriptions in Vermont, she not only concluded that she could not accept them as Ogams, but also suggested that they were not "any form of script at all." Some chambers, which Fell purported to be temples to Old World deities, based on associated inscriptions, even turned out to have documented historical builders. The marks found on Vermont's stone monuments are, most likely, the marks of chains and other tools employed in stone construction during the nineteenth century.

But what about my unusual experiences at the Pig Pen and all the dozens of astronomical alignments? Peebles writes that "a strong nineteenth century concern with proper solar orientation" is documented both in the historical record and in observations of colonial structures. The old New England farmers may not have worshipped the sun as a god, but they certainly depended on a detailed knowledge of its movements to warm their homes and nourish their crops. The stone walls in my Vermont town are oriented with meticulous precision along bearings that reflect the sophistication of the surveyors who laid their paths.

But were Europeans in contact with North America earlier than we give them credit for? "It's a really good question," says David Lacy, "and the answer is probably yes. But then, does it follow that a small number of people came here and built a number of stone structures over a large geographical area and didn't leave any archaeological evidence other than the structures? We've never really seen a good demonstration of anybody saying not only could they have been here, but they were here. I'm leaving the door open, but on the other hand, to assert that they were here requires you to have some evidence."

DAVID LACY

What we know — what we don't

In light of all of this, what can we conclude about New England's stone heritage? First off, the vast majority of the mysterious stonework in the forests of the Northeast is surely historical in origin. Peebles determined that many of the chambers were root cellars, but there were a variety of historical uses for the chambers and other structures in her study. Some were foundations for massive stone chimneys. Others were used as pens for animals.

But archaeologists have not closed the case on all of New England's stone structures. There are mysteries yet to be solved. Today, the focus has shifted from chambers, inscriptions, and standing stones to cairns like the ones in the Green Mountain National Forest. Of Vermont's collection of cairns David Lacy says, "People jump to conclusions – that they are Native American, pre-contact European, or colonial. Often, they're arguing from an ideological point of view. The truth is we need more data."

I went back to the Pig Pen on a sunny afternoon last summer, and this time I brought my daughter. She's four and full of questions – just like I was the first time I'd come. What is it? What's it for? Who built it? I wanted to tell her that it was built by farmers about two hundred years ago when the whole hillside was cleared of forest; that it may have held roots in the winter or maybe even pigs; that people had forgotten who built it for almost a hundred years, and that rediscovering its true story took patience and work and care. If I've learned anything from researching these chambers, it's how quickly we forget our own history.

But we perpetuate this illusion that our history is known, that we've puzzled out what it means. And our past is mysterious, more mysterious even than the stories that we invent to explain the few traces that remain – etchings on a gravestone, potsherds in a cave, piles of rocks in the woods. To tell my daughter that this stone chamber was built by a farmer is a bit disingenuous. It makes it sound as if the chamber's story is known and understood. So instead, I tell her that we don't know much, that we only have a few clues to go on. I tell her that the chamber is a mystery. "But," I add, perhaps a little mischievously, "I do know that the sun lights up the whole thing on the first sunrise of spring."

Benjamin Lord is a science teacher in Brattleboro, Vermont, and author of the blog, *The Foraging Family*.

Clockwise from top left: Glastenbury Mountain cairn; one of the Calendar Chambers; the Slave Pit from outside; inside the Slave Pit.

PHOTOS THIS PAGE BEN LORD

Theology

of Birds

Howard Norman

It is difficult to describe the Theology of Birds to which I am devoted, except to compare it to what Emerson said of his own spiritual condition: "It is always fully felt but ever only half thought out." This summer, when I heard the voice of a black-billed cuckoo, it did not, to my ear, belie any spiritual emptiness. On the contrary, I was reminded of eighteenth-century bird artist Mark Catesby, who heard in the cuckoo's haunting cry message after message from eternity. Anyway, if I had the black-billed cuckoo's experiences, abilities, and timeless dignity, let alone its voice, I would feel whole. Not to mention its ethereal beauty. This admits to the lofty aspiration to be other than human. And therefore, in part, it is what I mean by theology.

In my Vermont diaries of some thirty years, I've named every summer after a bird. The older I get, the more I see this as a kind of archival defense against fading memory; in the future I can page through and say, oh, yes, that was The Summer of the Kestrel, or, The Summer of the Eastern Phoebe. You get the idea. During a given summer, one bird always seems to be on higher exhibit than another. I cannot always say why. I suppose

LAUREN DI BICCARI

it depends on what naturally falls into one's attentions. I suppose it also depends on what is otherwise going on in quotidian life. The summer of 2012, for example, seemed almost sponsored by a relentless insomnia. Because of this, I witnessed, on nine different moonlit nights, a barred owl lift from the butternut tree and, in a blur and stretch of talons, sweep up a fat toad from the dirt road in front of my house. Each time I had been sitting on the front stoop without a thought in my head, more or less just waiting for the BBC to come on the radio. So naturally, that summer was The Summer of The Barred Owl. This past summer was The Summer of the Black-Billed Cuckoo.

My wife Jane and I did not arrive in Vermont until late July this year. On our first morning at home, walking in the rain, I heard a strange, wild voice I could not identify. Admittedly, my skill at identifying birds through their voices is at best dilapidated. But this voice didn't lend itself to the least familiarity. What is that? Not a clue.

I brought it up later at our annual neighborhood potluck, held at Scott and Charlotte Bassage's house. Lobster salad. Potato salad. Bread. Wine. The works. All set out on a picnic table. An exquisite late summer evening, rain in the offing, but holding off. As is customary at such gatherings – may I suggest, even expected – a kind of zoological gossip is exchanged. Kathy knew a bear had been at her blueberry bushes. An eagle, a kestrel, a fisher, a skunk ventured into someone's mud room. This sort of informal reportage is altruistic. There is a mutual solace in hearing that the world is still in good order. And there is a humbling recognition that the creatures we talk about don't need us. They only need to be left alone. Blessing for us, each time they allow us to see them.

However, before dinner, as we sat around a table in the house, the main topic of conversation was The Mysterious Voice. Eric Sorenson, co-author of *Wetland, Woodland, Wildland, A Guide to the Natural Communities of Vermont*, sat patiently listening to my hapless, if heartfelt, attempts to recreate the sound. He refrained from comment, no sudden burst of bragging erudition, unlike shouting an answer in a game of Charades. Finally, he said, "Oh, that's a black-billed cuckoo. Probably it's following the caterpillars around." Almost immediately, Scott looked up the black-billed cuckoo on his ipad and played its call. The recording had a little static, but there it definitely was, the voice we'd all been hearing out in the sloping fields, or edge of the woods, from some hidden place in the neighborhood of birds. Eric was showered with well-deserved gratitude and admiration, which he deflected by saying, "You would have probably found this out yourselves." Still, I experienced this whole incident as if an urgent Morse code message from the natural world had been interpreted and its good news read aloud, a miraculous reprieve from ignorance, a lovely clarification, a purchase on reality, a gift.

Early the next morning, along the brief walk to my writing cabin, I again heard the voice. Looking in *The Sibley Guide to Birds*, I found this Cuckoo's voice described as "a hollow whistled *po po po* repeated; sometimes a long, rapid series gradually falling into triplet patterns." *The Second Atlas of Breeding Birds of Vermont* verifies Eric's theory: "The species is usually most numerous in areas experiencing outbreaks of caterpillars, particularly the hairy varieties that most other bird species avoid." Reading this, I recalled that during the potluck Kathy remarked on her recent sightings of such caterpillars. "It seems there are more around than this time last year," she said.

A morning's search in my library of natural history art revealed no depictions of a black-billed cuckoo from antiquity, but did offer a watercolor of a black-faced cuckoo, done by William Ellis in 1785 while accompanying James Cook on an expedition to the Kingdom of Tonga and other far-flung islands. Ellis wrote of the black-faced cuckoo, "In its few simple precincts of subdued color, its regal posture, its plaintive soundings, I'm told it resembles the black-billed cuckoo of the North American continent. Again, witness the disparate outposts of the world connected by birdsong. It is a mystery and an orchestration of existence that fairly brings on deep religious feelings."

I cannot help but feel that this sentiment suggests that Ellis, who died after he fell from the mainmast of a ship at Ostend, may have developed his own Theology of Birds.

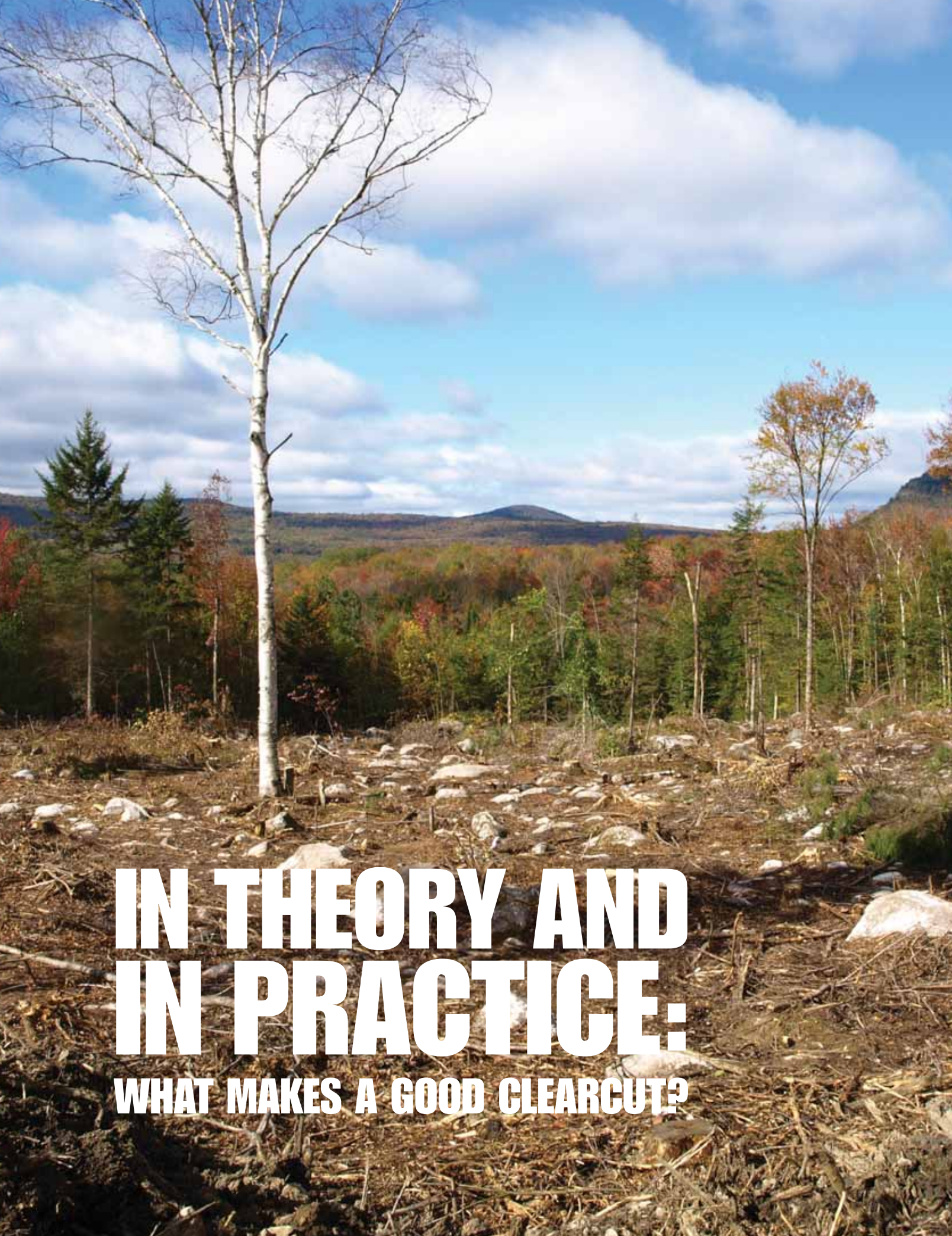
A Theology of Birds is a private matter. When someone remarks in passing, "I saw that pileated woodpecker again today," there's no reason to feel that the encounter with a woodpecker struck deep spiritual chords. It's just the imparting of information. It's just daily talk.

Still, on some basic level, I consider each and every mention of birds an acknowledgement of the ancient spirits that we live among. Abenaki folktales – from the Vermont region – are astonishingly rich in ornithological observation. In these stories, birds gossip about other birds. Sometimes birds and people talk with each other. Reading these folktales often intensifies in me a nostalgia – or longing – for a time I never lived in. Who in their right mind would not like to speak with birds? (I need help in living this life. I have questions to ask birds.)

In a treatise on Native American folktales, linguist Jaime de Angulo wrote, in 1927, "It's quite the shock, isn't it, when you read these folktales and discover that a grey jay, raven, or hawk is arguably capable of a deeper comprehension of life than us humans, capable of feeling things more deeply, far more assured and humorous in their philosophies, and needing far fewer words to put those philosophies across. And the only piousness they find necessary is demonstrated in their natural interactions with mountains, rivers, sea, and sky above. They don't need to petition a higher entity in order to obtain guidance as to how to act properly. In this regard, it is my contention that no birdsong should be considered prayer."

Entry in *Theology of Birds* notebook (August 2, 2013): Late in the afternoon, the voice of a black-billed cuckoo in the rain.

Howard Norman's most recent book is the memoir, *I Hate To Leave This Beautiful Place*. His novel, *Next Life Might Be Kinder*, will be published in 2014. He is also working on a memoir, *Will You Be With Me In The Late Hour,* which is mostly about birds.



IN THEORY AND IN PRACTICE:

WHAT MAKES A GOOD CLEARCUT?

By Mike Freeman

"They had to leave the hollies," Brian Tefft said, pointing across an opening studded with snow-touched slash to a pair of green-bowered bluebirds. "That was one stipulation. There's no commercial value and they're a local favorite. Birds love them."

Apart from these broad-leafed evergreens, a couple dozen oaks dotted the ten acres. Clenched tight to one scarlet specimen, a red-shouldered hawk perused the newborn field.

"There's a happy bird," said Tefft, who is Principal Wildlife Biologist for Rhode Island's Department of Environmental Management. "Grass has already sprouted, and with the slash – they had to spread it out to keep deer off the shoots – we have fine cover for mice. Rabbits, too. You'd be amazed how fast regeneration is, particularly with the retained masts. Look over here."

He walked thirty yards south, boots shedding snow, then stopped. A wall of saplings, well overhead, bifurcated two habitats, a deer mouse's pick-pock tracks undulating the border.

"Look how thick this is. This cut was 2007, the field 2012. Five years gives you young forest, and this is lousy soil, all pasture back in the day, not crops." He bent one of the taller saplings, sniffing. "Like spearmint – a sassafras. They grow fastest, but mostly we'll end up with oak and maple, some black gum and beech. Not much poplar like farther north, but you see the paper birch. Woodcock will use the open area for singing grounds, and this growth here for breeding. They feed down in the riparian zones. It's an ideal mix now."

We were talking about the Great Swamp Management Area in south-central Rhode Island. Two clearcuts were completed here in 1995, three in 2007, then two in 2012. There are two more rounds on the way. The idea is that the young forest conditions will help restore the region's grouse population, which has been severely depleted over the past few decades.

"The Arcadia Management Area had a check station for four weekends a season through the 1990s," Tefft said, "and they'd register seventy, eighty birds. Now you're hard pressed to hear a single drum in spring." In 2012, Rhode Island closed ruffed grouse hunting, unthinkable even ten years ago.

As Northeastern farmland has cycled to shrubland, then pole timber, and now to older woodlands, clear cutting and patch cutting are the most common ways to maintain a percentage of forest in early succession. The Great Swamp is Rhode Island's principal experiment. Partnering with the U.S. Fish and Wildlife Service and the Natural Resources Council, the Department of Environmental Management takes private landowners on tours here, hoping to nudge them toward what they see as sound stewardship. The aim is to maintain roughly sixty percent of Rhode Island's forest in maturity, while promoting diverse habitat in the rest and, by extension, diverse fauna.

CONTEXT IS KEY

Largely spurred by the century-old suppression of floods, fires, and beaver activity, the belief that re-invigorating early successional habitat is critical to wildlife management is held by a vast managerial majority throughout the Northeast, supported largely by U.S. Forest Service studies under Bill Leak, Mariko Yamasaki, and their colleagues at the Northeastern Forest Experiment Station.

Their book, *New England Wildlife: Management of Forested Habitats*, establishes that stands in the seedling and sapling stage attract the most wildlife species; once a stand gets beyond pole timber, it becomes less useful to many birds and mammals, even certain reptiles and amphibians. A diversity of forest age classes, then, should be the goal when managing for wildlife, as old is not necessarily good from an animal's perspective. A stand of even-aged sawtimber, for example, has about the same diversity of animal life as an old forest.

Context is key. "In a 40-acre parcel in agricultural, southern New England, we would not suggest even-aged management with five- to ten-acre clearcuts," they write. "In contrast, in a 500-acre parcel in the extensive forest of northern New England, use of clearcut regeneration would be very appropriate to provide a range of habitat conditions."

"In New Hampshire, which is 81 percent forested, saw-sized timber acreage is increasing, while early successional shrinks," said Yamasaki. "Well-executed clearcuts generate a set of ephemeral conditions where various soft mast species (wild strawberries, juneberries, raspberries, blackberries) can flourish for a few years before trees reclaim the land. The stem densities that make walking through such areas difficult are what make favorable nesting and foraging places for early successional songbirds and important post-fledging habitat for many other forest songbirds. Clear-cutting is just one tool, but an important one in promoting a habitat spectrum attractive to all species."

Rocky Bunnell, a logger and lifelong hunter from Monroe, New Hampshire, speaks to the value of clearcuts to game species. "When we do a cut or I know of a guy who's done some patches, that's where I'll hunt – turkeys right away, especially when there's good mast retention. Deer and moose love the new growth a couple years later, and grouse and snowshoes come in five, maybe ten years later when it thickens up, but once that starts you get thirty years of decent hunting."

Mainstream ecologists agree that forest disturbance – whether natural (beavers, fires, storms) or man-made (logging) – is an important part of ecosystem health. And yet acceptance of clearcutting to create early successional habitat is not generally favored by the public, many of whom can be outright hostile to it.

Part of this is visceral. Turning a forest is not like turning a field. To those unaccustomed to the sights and sounds of falling trees, even a two-acre clearing can evoke a Loraxian apocalypse.

CHARLES FERGUS / YOUNGFOREST.ORG

The goal of this clearcut on Vermont State Forest land was to start a new forest stand, with an eye toward regenerating spruce, yellow birch, paper birch, aspen, and balsam poplar. Moose, snowshoe hare, ruffed grouse, and various songbirds will benefit as the patch cut grows back.

Part is cynicism. One prevailing environmentalist notion, for instance, maintains that only timber industry propaganda claims that clearcuts benefit wildlife, all in an effort to disarm a properly upset public. Most foresters see this as ill-informed, yet many say that very sentiment profoundly influences forest policy debates and, quite often, a forester's decisions.

"I work with a lot of foresters," says Bunnell, "and can't tell you how many times I'll ask, 'Why isn't this block being managed? It's not doing well.' You know, a lot of sick trees, or maybe guys high-graded it years ago and left stuff that won't reach full potential, either for logging or wildlife. They'll say, 'I know, but you can see it from Route 3.' They just don't want the public headaches."

Another contention stems from the different ways people look at ecological time. The more sober voices caution against using the last a hundred years as a reference for determining how to manage woods. In other words, we can't make judgments based on the percentage of land in early successional stages in the 1960s.

"People need an appropriate reference," said Mollie Matteson, Conservation Advocate with the Center for Biological Diversity's Richmond, Vermont, branch. "While certain species benefit from early successional habitat, the truth is that the peak we grew up with was an artificial boom, with clearing through the 19th century as the massive disturbance that allowed it. To me, this precludes the last hundred years as a framework. Pre-Contact New England was 95 percent forest cover and, contrary to many opinions, multi-aged. Beavers created early successional habitat everywhere, and along with lesser windthrows and fire you had big events. Sandy and Irene obviously weren't the first. Great blocks of interior forest are crucial, and I only suggest we use the proper timeframe."

Harry White, director of the Weantinoge Land Heritage Trust in northwestern Connecticut, puts it this way:

"There's a misconception that New England's forests are over-ripe, but maturity for many forest types here runs three to eight hundred years. Cutting, even clear-cuts, has a place, but there's an argument for old growth. Look at the Phelps Research Area in Colebrook [Connecticut]. It was cut in 1912, but even with a hundred years the place is spectacular, and people should stop omitting no logging as an option, especially on public land."

Clearcut debates, then, on philosophical, theoretical, and practical levels, currently preoccupy much of northeastern forest management, all begging the question: How do you know when a clearcut is a good idea? What does a responsible one look like? What's a reasonable justification? And while the answers are varied and site specific, there are some general rules worth noting that can be particularly valuable to property owners as well as anyone concerned with proposed clearings on a cherished public plot.

A clearcut at age one, age four, and age 14.

WILDLIFE HABITAT

A healthy forest is a diverse forest – a mix of young woods, old woods, wetlands, and water. In heavily forested areas, clearcuts provide the young forest element of this mix, particularly in lieu of the aforementioned floods and fires, along with modern beaver populations that pale with historic abundances. Even the effects of big storm events are largely mitigated now with most timber stands roughly in an adolescent phase, with the majority of trees strong enough to withstand high winds.

Phil Brown, Conservation Director for Audubon New Hampshire, has supervised two wildlife motivated clearcuts at Willard Pond in Hancock and Bellamy Pond in Dover. At Bellamy, the goal was to promote the cottontail population. Timber wasn't harvested, and select black gum and oak trees were felled and left on the ground in a way that resembled windthrow. At Willard, a harder sell, sixteen acres of chip-grade white pine were removed from reclaimed pasture. "I had internal struggles," Brown said, "but it released the apples and we've seen birds thought to be deep forest only use regenerated edges, like ovenbirds, particularly in the fledgling stage. More insects and better cover."

Placing a potential habitat improvement cut within a broader context is essential, particularly in the heavy fragmentation of southern New England, or even southeastern New Hampshire and greater Burlington. Many voices here echo those of Leak and Yamasaki. Geoff Krukar, an avian researcher with the Connecticut Department of Energy and Environmental Protection and a strong advocate for appropriate clearing, cautions against clearcutting smaller forest plots abutting development. "Whatever benefits you might gain with young forest growth are generally nullified when you open up woodlands in predator-heavy suburban zones, which will give raccoons, housecats, and cowbirds – among others – easy access to nesting sites."

FOREST HEALTH

Clearcuts can remedy the sins of our fathers, who, through practices such as high-grading and plantation growth, have left certain sections of today's forests in poor health. Several cuts in Massachusetts' Quabbin Watershed, for instance, which generated voluminous public objection, were prescribed to remove diseased red pine plantations and allow a more naturally functioning forest to re-establish. In other instances, a clearing can begin anew when pests or pathogens have afflicted a stand or where the best, most vigorous trees have been removed, leaving only runty, crooked stock. Tim Mooney, with the Rhode Island Nature Conservancy, worked with Brian Tefft and others to implement such cuts on Tillinghast Pond in West Greenwich.

"At Tillinghast, we cleared a 27-acre parcel and an 11-acre one (out of 2,200 total acres). These were poor quality stands – twenty-year-old, unhealthy white pine in one, and mostly oak with a white pine understory in the other. The oaks, though, had 50 percent mortality. I carried into my professional life a desire never to see a tree cut, but having seen bird diversity jump by a third following the harvest – especially some troubled species like field sparrows, prairie warblers, and woodcock – that emotional wrestling is gone. You walk those transitional zones in spring now and hear a great deal more chatter than you used to. Now all I think is, 'Where can we do more?'"

Landowner Fred Ernst has managed his 620-acre Acworth, New Hampshire, property to rectify past logging abuses.

"We've done five cuts over four years, from five to seventeen acres, and though we'll slow down, we're getting everything we hoped for. This is old farmland that has been high-graded over the years, leaving some poor stands. Where we've cut we're getting aspen, oak, and maple regeneration, while leaving plenty of interior forest."

A series of patch clearcuts provide texture to a mature forest landscape. Viewed from above they're not unlike a series of beaver meadows, beavers being a more traditional source of forest diversity.

JOHN D. HODGES

Effect of Clearcutting on Breeding, Early-successional Birds

BIRD SPECIES	FIRST APPEAR	BECOME COMMON	DECLINE
Ruffed grouse (drumming males)	10	15	20
Northern flicker	1	1	7 to 10
Olive-sided flycatcher	1	1	3 to 4
Willow flycatcher	1	2	5 to 7
Tree swallow	1	1	7 to 10
Winter wren	1	4	7 to 10
Eastern bluebird	1	1	2
Veery	3	10	20
Swainson's thrush	2	4	15
Cedar waxwing	2	4	7 to 10
Chestnut-sided warbler	2	4	10
Black-and-white warbler	3	10	NA
Mourning warbler	2	5	10
Common yellowthroat	2	6	10
Canada warbler	5	15	NA
White-throated sparrow	1	2	NA
Rose-breasted grosbeak	3	15	NA

RICHARD M. DEGRAAF

NA indicates bird is present until next cutting cycle. Authors assumed some residual stems (snags and live trees) remain.

Sometimes clearcutting is used to start things over when a forest isn't on the right track. The picture at top left shows an even-aged stand of misshapen white pine. Note the lack of structural diversity. The photo below it shows a different part of the same stand that's been patch cut. Note the different age classes of trees.

PREFERRED SPECIES

Silviculture of any kind has the aim of fostering certain tree species, which can serendipitously wed commercial and ecological benefits. Such forest plans vary by region. In northern New England, where undesirable species like beech or hay-scented fern are present, patch cuts and small clearcuts can help out the more desirable species. "Beech thrives under partial harvesting," said Rob Bryan, a Maine forester, "so if you want higher grades like rock maple or yellow birch, then clearing is a good option."

In southern New England, oak has become a preferred species, along with efforts to restore pitch pine, particularly in Connecticut. Deer browsing, fire suppression, and competitive invasives are a problem everywhere, but are especially bad in southern New England and oaks have suffered accordingly.

"Today's oak stands had perfect conditions to come of age a hundred or more years ago," said Emery Gluck, a forester with Connecticut's Department of Energy and Environmental Protection. "Fires and charcoal clearings, the chestnut blight, and little to no deer browse. In 1896, twelve deer were reported in Connecticut. Things are obviously different now. Deer prefer oak to maple, birch, and beech, and we have a lot of sun-loving invasives here, like bittersweet and honeysuckle. Most oak seedlings, then, don't make it, and we're losing oak/hickory mixes to the ecologically less desirable maple/birch/beech stands." Buttressing this last point, oak stand bird diversity is double that of maple forests, possibly, Gluck speculated, because of higher insect abundance in the deeply corrugated bark.

To thwart this trend of fading oaks, foresters are using a variety of techniques, with clearing only occasionally chosen.

"We shun a cookbook mindset," Gluck said, "as doing the same thing all the time isn't wise for biodiversity. Connecticut is certainly implementing clearcuts for wildlife purposes, especially New England cottontails, but when it comes to sustaining oak forests that won't sustain themselves, variety is best."

Like Phil Brown, Gluck and others often try to mimic natural events, such as microbursts, tornadoes, and windthrow. Shelterwood cuts (essentially a clearcut in slow motion, where two thirds of all the trees are cut, the understory is allowed to regenerate, then the rest of the overstory is harvested) are a favorite as well, but even then there are options. Gluck prefers

This 2011 clearcut was part of a 26-acre habitat restoration project in Pelham, New Hampshire.

to space retained trees, whereas a colleague often clusters them in tenth of an acre and larger patches. In each case, once the oak seedlings have a root collar the width of a pencil, usually in four to six years, a second cut is done.

Controlled fire is an increasingly popular choice as well, especially when both oak and pitch pine are the targeted regeneration species.

"This is forgotten," Gluck said, "but many of Connecticut's pines were pitch pine, nearly all of which were removed by the 1700s for making pine tar. Both oak and pine do well in burn conditions, and in fact evolved that way, so that's a good choice, but it's more than just lighting a match. At the Hopeville Pond [State Park] burn last spring, we had to take out all the white pine first, as we initially couldn't get a hot enough fire. Now, though, preliminary results look good."

BEST MANAGEMENT PRACTICES

As in all silviculture, best management practices must be applied. Many are universal, such as planning a harvest to limit soil erosion, spreading slash to protect shoots and provide initial wildlife ground cover, smoothing ruts and landings, and choosing the right skid/haul routes. In addition, while invasive control is paramount in any logging operation, it's particularly critical in clearcutting, as many exotics adore both open sun and disturbed ground. In fact, if invasives dominate a stand, doing nothing can be the best option, while in other cases mechanical or herbicidal removal should precede the harvest.

For several reasons, public relations among them, followup is essential. If merchantable wood is a cut's chief aim, a proper forest plan will include future harvest date recommendations. A common template is thinning at 50–60 years to release the best trees, while implementing another clearing or shelterwood cut in 100 years. Future site visits are vital to invasive control, as well, where any growth should be removed. This is true even of some native species like fox grape, an aggressive plant that strangles even large trees. Harry White, the Weantinoge director, deems anything else "slob logging." "I mean, what will you have in ten years, the enchanted barberry forest?"

Mariko Yamasaki catalogs additional mandates to ensure a clearcut will do what all silviculture should: provide for the present while improving the future.

"In larger cuts," she said, "smaller retention areas, often grouped around special features such as seeps, large cavity trees, conifer inclusions, hard mast trees, and others, increase diversity, and buffers or retention zones should be variably placed around slopes, different stream orders, and other features, sometimes in combinations of no-harvest zones and limited harvest areas. It should be noted, though, that on low-gradient streams patch and clearcuts up to the water can encourage beaver habitat through hardwood growth."

The fact that Northeasterners are arguing over what to do with trees at all is a high-class problem, unthinkable to Depression-era minds, though it shouldn't surprise. If agreement on forestry practices can be sparse, it's universally acknowledged that the Northwoods can take a punch. After all, the northern colonies were little more than a paddock, with Vermont alone keeping nearly two million sheep on denuded slopes well into the 19th century. Now the woods are back, though fragmented and compositionally different. While this seems a pleasant shock, history fuels fears that what's here now can be gone tomorrow, with the slippery definitions of "what" and "now" coloring the clear-cut debate, variables for time and space. To some, such as Mollie Matteson, using our collective living memory as a reference point will jeopardize future forest health, while on the other pole some have seized on the decline of animals that depend on young forest – such as the American woodcock, brown thrasher, and New England cottontail – as an excuse to strategically whack away.

Jeremy Turner, a New Hampshire forester who assisted Phil Brown's Audubon cuts and grew up amongst loggers in central New Hampshire, has an equatorial view:

"You want to be careful, as I've seen some really abusive cuts, but clearcuts can be critical in providing both diverse habitats and economically viable timber. We're lucky. Our temperate forests regenerate beautifully. On the other hand, I hold to Aldo Leopold's land ethic and the idea that some land should be left unmanaged by humans. There's so much we don't know, and we don't want to break critical linkages or forego genetic stability by managing everything."

The northeastern forests, then, have returned, towing with them a fractious array of opinions over proper management. For the time being, the practice of clearcutting will be hashed out in the heaven-hell swamps of democracy, which, despite our aggregate gripe otherwise, usually breed sensible, middle-path organisms. Cuts will be made, reserves will be set, no one will be entirely pleased, and the forest will go on influencing us as much as we do it.

Mike Freeman lives in Rhode Island and is the author of *Drifting: Two Weeks on the Hudson* (SUNY Press), as well as a hunting memoir forthcoming in the spring of 2014.

TED KENDZIORA/USFWS

A CABIN IN THE WOODS

Story and Photos by Ross Caron

We carefully rolled the big spruce log with our peaveys, and it settled into place with a thunk, fitting almost perfectly over the log beneath it. A little fine tuning with axe and chisel and it should fit even better. After six or seven courses, we were finally getting pretty good at scribing and fitting logs for our cabin.

The dream began when my grandfather gave my brother Todd and me (then boys of nine or ten) little wood-handled hatchets for Christmas. We were instructed on their safe and proper use and shown some places where we could cut some brush. It wasn't long, however, before we were in the "deep" woods, eagerly taking turns chopping at the biggest, tallest fir we could find in hopes of building our own log cabin. I can remember chopping all around the tree like a beaver would do, which gave us no control over the direction of fall (tree felling hadn't been covered in the hatchet safety course). After what seemed like a very long time chopping, and with the tree finally on the ground and limbed, we soon learned just how much work it would be for small boys to drag logs that big to our proposed cabin site. The project was abruptly abandoned.

Later, as adults, we read over and over again *One Man's Wilderness*, a book by Sam Keith based on the journals of Richard Proenneke. Richard had quit his job, built a log cabin on the shore of an Alaskan lake, and lived there for thirty years. His photos and the PBS documentary about him, called *Alone in the Wilderness*, were inspiring.

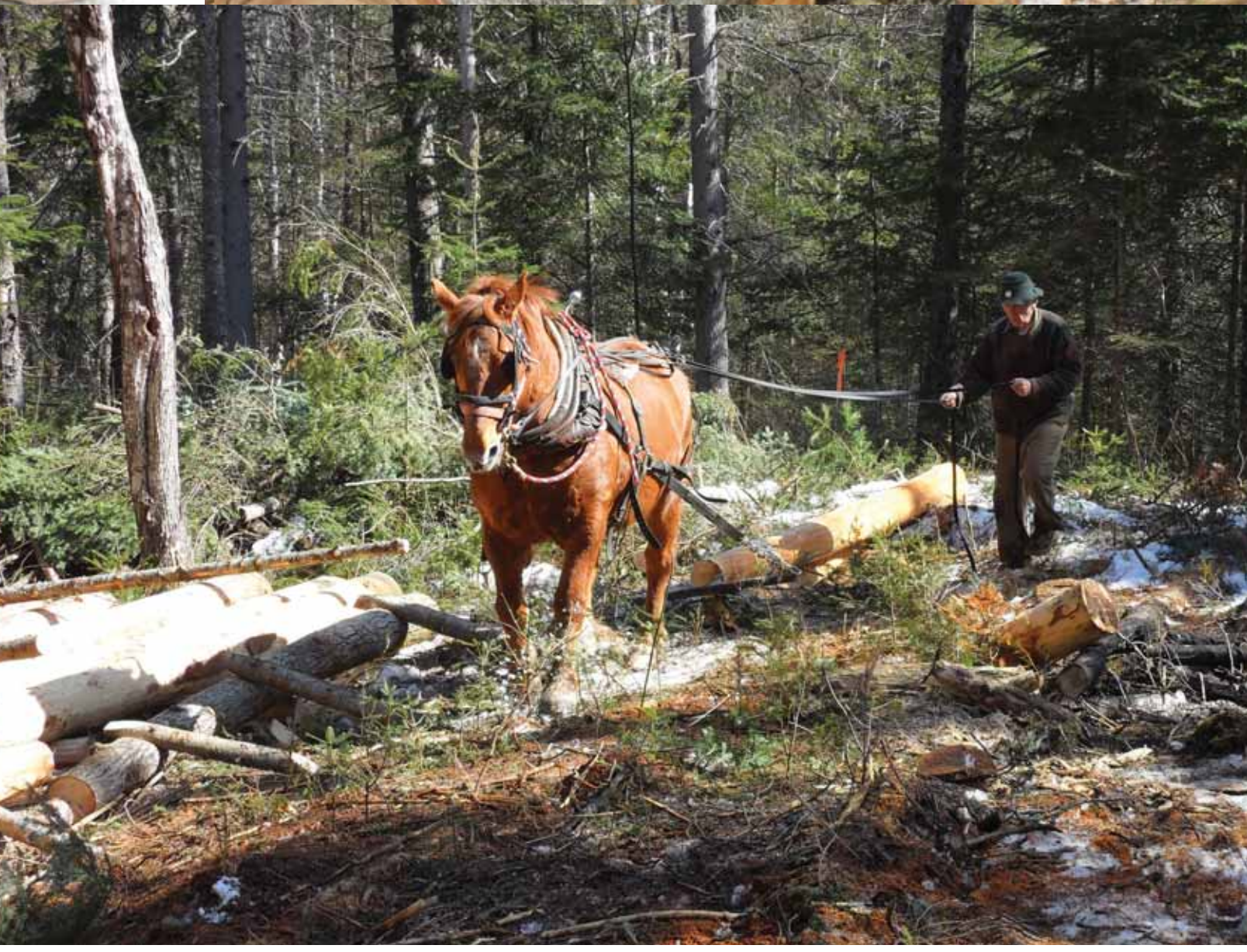
In the late fall of 2011, it was suggested, rather strongly, that I wasn't ready to be grown up. My brother had also recently reverted back to bachelorhood, and we decided it was as good a time as any to revisit our boyhood dream of building a cabin. We picked a site on our grandfather's woodlot and got to work. We had some building experience and were skilled with chainsaws, but we had never done any log scribing. After watching several YouTube videos on the subject, we felt we were ready to try it. Like Proenneke, I kept a journal and took photos of our progress.

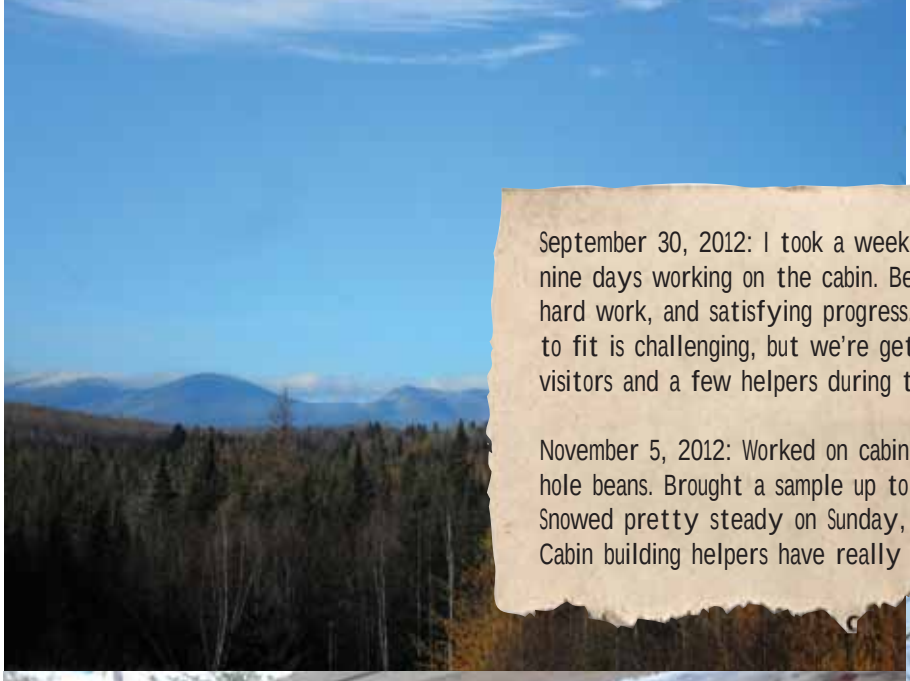
January 1, 2012: Went up to the woodlot to cut and peel some cabin logs. Built a nice fire and cooked lunch. Felt good to work with my hands in the fresh air.

March 12, 2012: Warm and sunny today. Rick Alger brought his horses, Emma and Ruby, up to our cabin site to twitch our logs. We stacked the logs up off the ground to dry. Sixty plus logs cut and peeled this winter — should be just about right.

Ross Caron lives in northern New Hampshire and works as a procurement forester. He enjoys a variety of outdoor pursuits, reading, working with wood, and managing his family's woodlots.

February 24, 2012: Cut and peeled some more cabin logs. Finished seven today. Felt good to be working in the woods. We've been working on logs every weekend this warmest and least snowy winter I have ever known. Logs peeling pretty hard.





September 30, 2012: I took a week off from work and spent the last nine days working on the cabin. Beautiful fall colors, crisp nights, hard work, and satisfying progress. Scribing logs and cutting them to fit is challenging, but we're getting the hang of it. Many visitors and a few helpers during the week.

November 5, 2012: Worked on cabin this weekend and made bean hole beans. Brought a sample up to Grandpa — he approved. Snowed pretty steady on Sunday, but didn't accumulate much. Cabin building helpers have really tailed off!

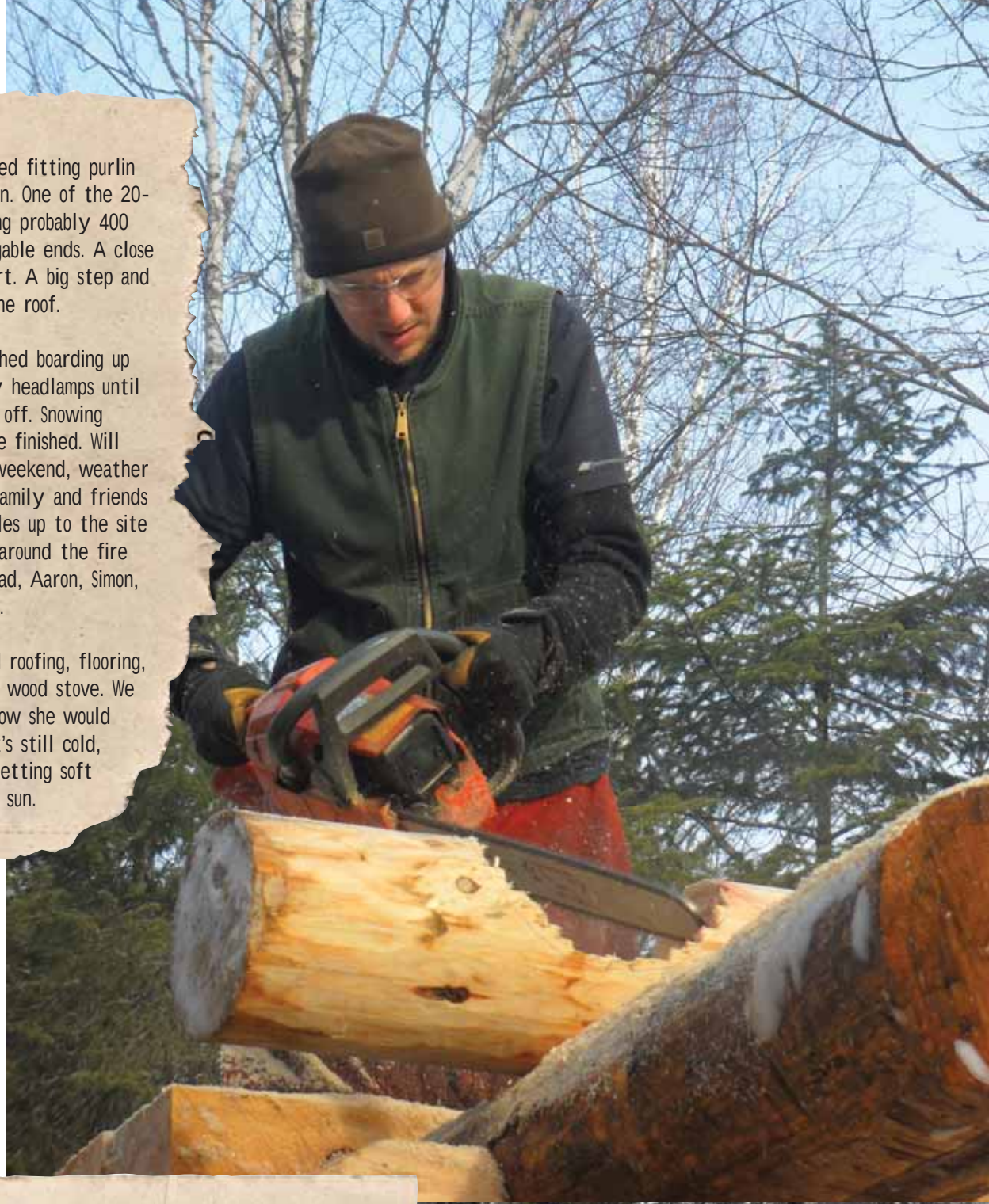
November 10, 2012: Beautiful, clear, breezy, with a little snow on the ground. Leavitt Stream is babbling, the fire crackling, and the wind sighing in the trees. All was calm and peaceful until we fired up the saws! Seven logs high now.

November 22, 2012, Thanksgiving Day: Eight logs high. Very satisfying work. I dropped a log on Todd's chainsaw. Saw damaged pretty bad.

February 3, 2013: Finished fitting purlin logs and rafters on cabin. One of the 20-foot purlin logs, weighing probably 400 pounds, rolled off the gable ends. A close call but nobody was hurt. A big step and now we're ready for the roof.

February 23, 2013: Finished boarding up the roof. We worked by headlamps until 8:00 p.m. and tarped it off. Snowing heavily by the time we finished. Will plan on shingling next weekend, weather permitting. Dandeneau family and friends helped carry the shingles up to the site and joined us for lunch around the fire today. Also, Mom and Dad, Aaron, Simon, and a multitude of dogs.

March 10, 2013: Finished roofing, flooring, and installed the little wood stove. We lit a test fire to see how she would draw. All went well. It's still cold, but the woods road is getting soft in the strong afternoon sun.



March 16, 2013:
Made and installed door and put in windows. We stayed overnight for the first time and slept on the floor. A very cold night, near 0 degrees, and it probably wasn't much warmer on the floor!

March 23, 2013: Finished building bunk beds and stayed over again. A much warmer night. We removed our tools and left over building supplies as it may be the last weekend we'll be able to drive close to the site.

April 19, 2013: First warm day of the spring — near 70º. Walked into cabin tonight with Todd and Bodie the dog. We began our walk just at dusk and the air was alive with woodcocks. Must have been 7-8 different males peenting, whistling, and diving. The sky was heavy with dark, slate-gray clouds and it was windy. Heard one lone peeper in the distance with a plaintive and half-hearted attempt at song. Rain and wind during the night and the sound of the rushing brook coming in through the open windows. Awoke to cold, clear air from the northwest and a pair of dueling winter wrens singing right outside the cabin. I stepped outside, looked at our little cabin and in the words of Dick Proenneke, "enjoyed thinking about what I had done to make reality out of a dream."

For Grandpa

As Don Enman strode through the silent winter woods on snowshoes, he carefully surveyed his surroundings. It was the winter of 1960 and he was 39 years old. Alongside him was Dr. McVetty, a popular local family practitioner and the current owner of the woodlot they were cruising. McVetty was thinking of selling and knew that Don had been looking to buy some timberland. Don operated a dairy farm a couple of miles away and had purchased a 100-acre woodlot near the home farm some years earlier, in hopes of supplementing farm income with timber cutting during the winter. He found he really enjoyed the woods work and the idea of owning another woodlot excited him.

The property they were looking at had been heavily cut over in the late '50s and was now mostly saplings and poles. This would be a long-term investment, for sure. Although it took some imagination, Don really liked what he saw. It appeared to be a lot with good growth potential; there was a beautiful stream winding its way through the center, a beaver pond, and a side hill that showed potential for a good hardwood stand and maybe even a sugarbush. Before he left to snowshoe two miles back to the main road, he had already made up his mind.

Fifty-three years later, I am grateful to Don – my grandfather – for his foresight. Since that winter day in 1960, over 1,700 cords of sawlogs, pulpwood, and firewood have been harvested off the site. Almost without exception, the trees that we selected and cut for the cabin were 50-55 years old, just seedlings when he first set foot on the property. There remains a beautiful stand of trees, of mixed species and varying age classes. There are patches of pure spruce and fir, a couple of hardwood ridges, some enormous white spruces and towering white pines, a small cedar bog, beaver ponds, and the little stream still flows peacefully along.

Grandpa was still harvesting timber in his early 80s. As I write this, I'm thinking of him getting ready to go to the woods. The blue Ford tractor, outfitted with tire chains, winch, chainsaw, and tools, would be idling in the driveway warming up on a below-zero morning. He'd leave the house, lunch in hand, climb up into the open cab, and drive away from the farm bundled up against the cold. It was obvious how excited he was.

Grandpa, now 92 years old, was very much interested in the cabin building project. He expressed genuine regret that he wasn't able to work alongside us, sawing, drilling, and handling logs. We surely would have been happy to make use of his woodsman skills and chainsaw expertise. He did visit the site on several occasions while we were working, joined us for lunch a couple times around the fire, and on one beautiful, clear fall day when the leaves were at their brightest color, enjoyed a ride up with Rick Alger on a cart pulled by two horses. While he can no longer work in the woods himself, I am certain that he's happy and proud to see his grandsons carrying on where he left off.

From right: Don Enman, Todd Caron, Ross Caron, uncle Steve Enman circa the early 1980s.

Story and Photos by Stephen Long

At Work Trucking Logs with Don Moore, Jr.

Log truckers have nothing to haul if loggers aren't cutting wood, and the rain this past summer kept loggers out of the woods for weeks at a time. Don Moore, Jr., a log truck operator from East Peacham, Vermont, said, "We're always at the mercy of the weather. It's the biggest thing I'm up against. This year we didn't get started until the middle of May, worked two or three weeks, and then it started raining. It rained until mid-July, so it was a really slow summer."

The weather finally broke, and the four loggers he hauls for returned to the woods, so he went back to the daily juggling he does to try to keep them all happy. If each of the four is producing a load a day – 10 cords of firewood or 5,500 board feet of sawlogs – it can be hard for Moore to keep up. One of the challenges is that the hilly terrain of Orange and Caledonia counties, where he does most of his work, often doesn't allow for much of a log yard or landing. Flat, dry ground can be a precious commodity, and a small landing can get so piled up with logs that there's no room for either the skidder or log truck to maneuver. And he can't haul for each logger every day – thus the juggling part.

Most days, Moore arrives at a log landing at 6:00 a.m. If he's lucky, he can back his International tractor trailer right into the landing, load it up with logs or firewood, and drive out. Often, though, he'll need the logger to hitch onto his truck with the skidder's winch and pull him into position. "I'm hooked onto more in the summertime than winter. Seems there's always a wet spot I can't get through on my own. There's a pin on the front bumper to pull me frontwards and there's one on the back of the trailer if he needs to pull me backwards. Everything rolls so much easier on frozen ground," Moore said. It will take him less than an hour to stack the logs neatly onto the trailer with his center-mounted log loader. He delivers pine and hardwood sawlogs to a handful of sawmills within 40 or 50 miles. The distance to the mill enters into what Moore charges for his services. For sawlogs, his base price is $50 per thousand board feet, to which he adds a charge of 50 cents a mile per thousand. A 6,000 board foot load of logs going to a mill 40 miles away would cost $70 per thousand, or $420.

If the cargo is firewood, the main buyer is even closer. Pulpwood, on the other hand, goes to paper companies, all of which are farther away. "The farthest I go is Jay, Maine, once or twice a week. The pine pulp goes there." Jay is 170 miles one way, and other pulp deliveries go to the slightly closer Rumford, Maine, and Shelburne, New Hampshire mills.

After he delivers his first load, he'll head to the second landing, planning to arrive at a prearranged time. "Most of the guys I haul for don't have a cell phone in their pocket all of the time," Moore said. That's because cell phone coverage is almost nonexistent among these hills and hollows. If all is going according to schedule, the logger will be pulling a hitch of logs out of the woods when Moore arrives. That way the logger can pull the truck in if necessary.

Kevin Braman, a Chelsea logger who has worked with Moore for seven or eight years, said of his trucker, "What a super nice guy. He's always there when he says he's going to be. You can set your clock by him."

A reputation for reliability means a lot to Moore, and in fact, his frustration over the lack of reliability is why he ended up switching careers as a young man. He'd grown up in a farming family, and his father owned Moore Beef, a slaughterhouse and meat packing plant in St. Johnsbury. Don worked on a neighbor's dairy farm through high school and went to Vermont Technical College to study agriculture. "When I graduated in 1987, I went back to the farm I'd worked on. The guy was going to get done, and I was going to buy it," he said. He tried it out for a while, but when the help failed to show up one too many times, Don could see that managing employees wasn't what he wanted to do.

He turned to trucking milk for Cabot Creamery for a few years. Then came a short stint working for his father at the slaughterhouse. "I picked up cows and other animals for my dad for a while, but it wasn't for me," he said. In 1993, he took a job driving a log truck, and it suited him well – so well that four years later he bought his own truck. His current truck is about 10 years old, and he averages 50,000 miles a year, but it wears its miles well. Unloaded, it weighs 43,000 pounds, which means that he can legally transport another 56,000 pounds

of cargo, keeping him under Vermont and New Hampshire's 99,000 pound weight limits.

The work is a lot more complicated than just driving. Each pickup and delivery requires using the loader, whose controls are similar to those in an excavator. His foot pedals control the rotation of the whole loader, including his perch. The two hand levers control the movement of the boom and what he refers to as its bucket, the grapple he uses to grab the logs. "I enjoy it. It's like having an extra hand. It's second nature by now. You don't think about how you move all the different valves at once. But I can remember that it was a pretty slow process. I'd watched people do it, and I knew what I wanted to do but couldn't make it do it. It took a good year to get comfortable with it, especially working around people. Luckily nobody's gotten hurt. That's my worst fear."

The heaviest log he ever picked up was a 16-foot-long red oak log that scaled 600 board feet. "I could just barely lift it onto the trailer. I had to take the stakes out because I couldn't lift it over the top of them. The loader will lift 8,000 pounds, so that log was all of that."

As he was learning his loader, he also had to learn to identify wood in the pile by species and product, while perched 14 feet off the ground. Most of his loggers don't do their own sorting, leaving it up to Moore. "I rotate it to look at both ends to see that it's a log and not firewood – it could be rotten on one end. I make sure they're sound, look at the sides, the straightness, especially in hardwood. You can normally tell a hardwood sawlog because it's short and straight, 12 feet or shorter. Firewood is normally cut 16 feet or so, up to 20 feet." There's no such thing as a mixed load – everything he loads on the trailer is going to the same buyer.

Like most people in the forest products business, he's concerned about its future. He noted that there are many fewer mills than when he started 20 years ago, which means less competition for logs. "I hope the demand and prices come up so we can offer landowners enough to make it a sustainable business. I can't see a long future at today's prices, considering how much it costs to operate."

Speaking of cost, let's start with tires. Moore's truck has 22 of them. "I run recaps in the winter so I get the added traction, and they're less expensive. A recap will cost you $180 to $200, and a new tire can be between $500 and $750. In the summer, I try to put on something besides recaps, because you get better mileage with them, though you don't get the traction." He hopes to get 50,000 miles out of his tires, a year's worth of driving. And if you think your fuel costs are high, Moore averages 3.5 miles a gallon in the winter. The expensive new summer tires bring his yearly average up to 4 miles per gallon. That's $50,000 in diesel fuel each year. And his truck has a life expectancy of 10 years, which means that it won't be long before he'll be looking for a replacement. "I bought this one used, and I haven't priced anything recently, but a new truck will run you $150,000."

Despite the challenges, after 20 years Moore still likes climbing up into the driver's seat every morning. "I enjoy seeing the loggers, and I enjoy being off the beaten path. I try to take a walk on every job and look at the woods. I get to see some beautiful woods that way."

Stephen Long edited Northern Woodlands for 17 years.

Linking a Landscape

Story and Photos by
Anne Schwartz

It's late afternoon, and fine snow is sifting down into Joan and Bill Hildreth's woods in Montgomery, Vermont. Their property lies within a large expanse of forest on the edge of the northern Green Mountains. Four times a year, the Hildreths and their neighbors walk a three-mile route here, searching for animal tracks, claw marks, rubbed bark, and other signs of wildlife. In particular, they are on the lookout for evidence of black bear, moose, bobcat, and other animals fond of large, unfragmented blocks of forest.

The Hildreths monitor a section of forest that includes oak and beech stands, wetlands, a line of rocky cliffs, and a large stream – landscape features that attract different wild animals. It usually takes five hours for them to cover this transect, but today I'm getting an abridged version. With us are foresters Nancy Patch and Charlie Hancock, fellow members of the conservation group Cold Hollow to Canada.

Bill points out a paper birch with four parallel diagonal scratches – bear. "Before we took tracking, I walked by this tree a hundred times and never saw the claw marks," he said. Tramping through the snow, we come across a trail of widely spaced prints in clusters of four. Joan sets down a waterproof tracking guide with life-size illustrations and measures the prints. Everyone agrees it's a fisher. "We found a fisher scent post," Bill recalls, explaining that it is a spot where this member of the weasel family marks its territory and communicates

Looking from Canada into Vermont.

with potential mates. Eager to share their discovery, Joan and Bill lead us up a hill to what turns out to be a tiny tree stump. Squatting down, Joan waves me over to see the fine hairs caught in splintered wood.

Later, a series of roundish footprints catches Patch's eye. Everyone stops. "This one looks really classic," says Patch, pointing out the asymmetrical toe pattern and lack of claw marks that indicate a feline instead of a canine. "We know bobcats are in the area, but they're not very common," says Joan. "We're pretty excited if we see cat tracks."

Cold Hollow to Canada is a volunteer organization focused on education, land-use planning, forest management, and land conservation in seven towns in eastern Franklin County. On a small scale, they're working as citizen scientists to gather data on wildlife habitat. Members train with professional tracker Susan Morse, and then record animal comings and goings on the Cold Hollow website. Over five, ten, or 15 years, the data they collect will help identify important wildlife corridors in the region.

On a larger scale, they're working with landowners who wish to conserve their forestland and with towns to encourage them to incorporate forest conservation into their town plans. They've helped establish conservation commissions in three towns, and are working with local governments to develop zoning bylaws that would minimize forest fragmentation. All of this is in service of a larger goal: to maintain the ecological connections in the Northern Appalachian/Acadian forest, the great northeastern forest of the U.S. and Canada.

From global to local

Growing up in Enosburg, Vermont, near the Canadian border, Nancy Patch always knew she wanted to be a forester. She became the first girl in her high school to study forestry, after fighting to take the vocational classes. She still lives in Enosburg, on 200 acres of woods in a small house that her husband, a logger, built. A consulting forester for 20 years, Patch is now the Franklin-Grand Isle county forester for the state of Vermont. She serves on the Enosburg Conservation Commission, and has long been involved in local conservation issues.

Patch recalled the "aha" moment that led to the start of Cold Hollow. In April 2008, she attended a presentation given to the commission, about the research of Two Countries, One Forest – a collaboration of Canadian and U.S. organizations seeking to conserve and restore the Northern Appalachian/Acadian forest. This region encompasses 80 million acres along the spine of the Appalachian Mountains, from the Adirondacks to Nova Scotia. Its woods, wetlands, and waterways harbor a rich diversity of plants and animals, support much of the region's economy, and define its way of life. Although 5.4 million people live within its bounds, nighttime satellite images show vast expanses of dark.

The region's biological diversity depends on these expanses. Wild animals need safe pathways between habitat blocks so they can disperse to new territory, mix with different populations, and diversify their gene pool. So far, the Northern Appalachian region has lost very few of the species found in colonial times. But this could change if the forest's fabric is further frayed by suburban and industrial development.

Two Countries, One Forest identified five large, ecologically irreplaceable zones that tie the entire forest together but are at great risk of being fragmented. One of them is the 1.8-million-acre Northern Greens, where Vermont's Green Mountains flow across the border to Quebec's Sutton Range. "It was an eye-opener to see that what we do in our community makes a difference in a global way," said Patch.

Soon, the Enosburg Conservation Commission was inviting people in the area to identify lands they valued the most. "People were circling places they liked to hunt and fish, places they liked to hike, places that were really important to the wood products industry," said Hancock, a young forester who had recently moved to the area to take over Patch's consulting business. "You got a lot of overlap. Certain areas started to pop up as being a really important part of our region." It turned out that the places people cared about were also essential for wildlife.

At a subsequent meeting, volunteers stepped forward to start a region-wide group to protect those places, naming it after the landscape it covers, from the southern Cold Hollow Mountains to the Canadian border.

To guide their land conservation efforts, Cold Hollow's steering committee created a map based on analyses by Vermont Fish & Wildlife, the Vermont Land Trust, and a regional conservation group called the Staying Connected Initiative. The map shows high-value habitat blocks and connecting pathways, overlaid with parcel boundaries to help people see where their properties fall in the larger landscape. Cold Hollow's members connect landowners with government agencies and conservation organizations that can help them conserve and manage their forest for wildlife.

The group is also building ties across the Canadian border. During my visit, I drove with Patch and Hancock 15 miles to Sutton, Quebec, for lunch with Louise Gratton, chair of Two Countries, One Forest, Charles Weldon, a Sutton city councilor, and Mélanie Lelièvre, executive director of Appalachian Corridor, which created and assists a network of local land trusts in southern Quebec. Over quiche and salad, they swapped strategies for crafting town bylaws to limit forest fragmentation and talked about their vision for the region they share. "The more land that can get conserved in the Green Mountain linkage in the Sutton Range," said Patch, "the better our habitat will be in the southern part, and vice versa."

Pieces of the puzzle

Driving around eastern Franklin County you see forest everywhere, but a map of land ownership shows a patchwork of smaller parcels, and very little of the forestland is protected from development. Jay Peak, the popular ski resort just across the county line, is expanding and attracting second home development. Montreal is an hour and a half

Regional Conservation Partnerships

Regional conservation partnerships like Cold Hollow to Canada are flourishing throughout the region – in New England there are 38. Two umbrella partnerships, Two Countries, One Forest and the Staying Connected Initiative, work across the entire four-state, three-province Northern Appalachian ecoregion.

To learn more:

Wildlands and Woodlands
www.wildlandsandwoodlands.org/rcpnetwork

Staying Connected Initiative
stayingconnectedinitiative.org

Two Countries, One Forest
www.2c1forest.org

Clockwise from top: Cold Hollow to Canada group outing; Charlie Hancock points at otter scat; Nancy Patch and a bounding fisher's tracks; confirming the tracks.

away. So is Burlington, Vermont's largest city.

Though the low-density development typical in northern Vermont may not seem to change the landscape dramatically, studies show that it has a major impact on the quality of wildlife habitat for miles around. A house site and its associated roads create opportunities for predators (including household pets) and invasive plants that diminish forest diversity. It also brings human activity that many animals avoid.

Many of the large parcels of forestland in the region have been conserved – most recently the 936-acre Jackson Valley property in Jay, where the purchase of a conservation easement closed a major gap in the Northern Greens wildlife corridor. But funding to conserve smaller properties, which make up most of the remaining unprotected forest, is harder to come by.

A conservation easement keeps the land in private ownership, restricting development but allowing timber harvesting and other sustainable uses. But even if a landowner is willing to donate the development rights, the costs of doing the transaction – appraisals, legal and closing fees, and stewardship costs – are often prohibitive. Cold Hollow can help landowners navigate the process or group parcels together to improve the odds of attracting funding.

At the end of 2012, Cold Hollow completed its first land conservation project, called Adams Pond, which was made possible by funding from Staying Connected and the Vermont Land Trust. Patch and her husband, together with two neighbors, donated easements on their properties to the Trust, protecting three almost contiguous parcels totaling nearly 500 acres.

Meanwhile, the group's wildlife monitoring programs, workshops, hikes, and potlucks have been laying the groundwork for future habitat protection and stewardship. "We are planting seeds that might take ten years to bear fruit," said Patch. "A lot of what Cold Hollow has done is to build a foundation of appreciation for our forests."

The group recently received a grant for a pilot project to organize neighbors to do cross-parcel forest management. "The idea is to put our heads together and look at managing the landscape holistically," said Hancock. "Everybody can manage for their own uses, whether it's for grouse habitat or more intensive timber management. One landowner's plan can complement the others."

"It's a social connection, too," said Patch. "If you're doing work on the land with your neighbor, all of a sudden you know your neighbor better."

Wildlife without borders

It was late afternoon and still snowing when we emerged from Bill and Jan Hildreths' woods. The snowstorm blanked out the mountaintops in the distance. Patch, Hancock, and the Hildreths were exuberant from the afternoon's finds. They had seen fresh tracks of bobcat, fisher, and mink, three of the eight species on their list.

They had also seen tracks of a snowshoe hare – the main food source for the Canada lynx, listed under the Endangered Species Act as a threatened species. "This bodes well for lynx," Patch said.

Though the lynx was never abundant in Vermont, the southern end of its range, it has long been absent from the state. Maine has the only confirmed breeding populations in New England. But the species is known to travel up to 200 miles, and recent sightings in northeastern Vermont raise hopes it might return to the Northern Greens.

Whether or not lynx return, a network of wild forest across the northeastern U.S. and southeastern Canada is the pathway for all manner of plants and animals to move and adjust their ranges, especially as the climate changes. Cold Hollow's landscape is a major strand binding that web together. Here, in the woods they call home, Patch, Hancock, and the others are working to keep it connected.

"We live at a crossroads for wildlife," said Patch. "Without the links in our area, we will lose that forest as a whole."

Anne Schwartz is a writer who specializes in land conservation, parks, and the environment. She is the author of *Rescuing Wetlands Close to Home: Ten Stories of New England Landowners.*

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Story by Virginia Barlow

Illustrations by Adelaide Tyrol

Staghorn sumac

Rhus typhina

A small tree with big leaves, staghorn sumac has a lush tropical look when it's in full summer plumage. This short-lived tree typically gets to be only about 25 feet tall, but its frond-like leaves, made up of 13 to 27 leaflets, are up to 24 inches long. They tend to be deployed in tufts at the top of the tree, in a palm-like fashion. Interestingly, most of sumac's relatives, which are in the Anacardiaceae or cashew family, are tropical and include pistachios and mangos, as well as cashews.

Staghorn sumac, the most common sumac in this area, is also the easiest to identify. Its hairiness is unmatched: the buds, twigs, flowers, fruit, and even the midribs of the long compound leaves are covered with dense, reddish-brown hairs in somewhat the same way that velvet covers the horns of a stag; hence the common name.

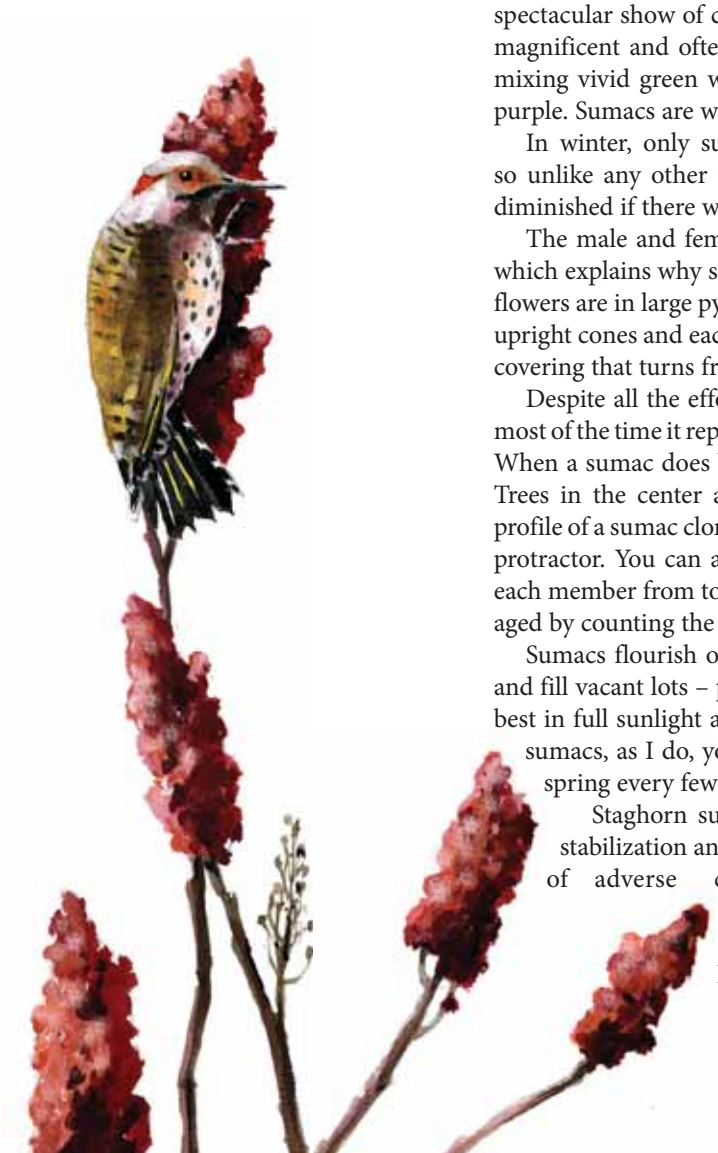
The undersides of the leaves are silvery, even in autumn when the tree puts on a most spectacular show of color on the upper surface of the leaves. Sumac's autumn colors are magnificent and often found along roads and highways. Each patch is different – one mixing vivid green with bright pink, while the next combines mellow orange and hot purple. Sumacs are without question the superstars of the annual autumn performance.

In winter, only sumacs have such stout, widely diverging branches. This shape is so unlike any other tree or shrub that the richness of the landscape would surely be diminished if there were no sumac.

The male and female flowers open in June and are usually borne on separate trees, which explains why some large groups of trees have no fruit at all. Both male and female flowers are in large pyramidal clusters of tiny flowers. The fruits form on female plants in upright cones and each one may have 700 or more seeds. Each seed is encased in a bristly covering that turns from green to red over the summer.

Despite all the effort this tree goes to in making many thousands of beautiful seeds, most of the time it reproduces instead from nodes on underground stems, called rhizomes. When a sumac does begin life as a seed, it proceeds to beget an extended clonal family. Trees in the center are the oldest; the youngest are at the periphery. Sometimes the profile of a sumac clone is so perfectly rounded that it looks to have been shaped by a giant protractor. You can assess the development of this family by counting the branches of each member from top to bottom: a sumac branches every year, and an individual can be aged by counting the number of times it forks.

Sumacs flourish on the most inhospitable terrain. They crowd up to railroad tracks and fill vacant lots – places no other self-respecting tree would look at twice. They grow best in full sunlight and only old sumac skeletons are found in deep woods. If you love sumacs, as I do, you can rejuvenate your patch by cutting them to the ground in the spring every few years.



Staghorn sumac has been introduced to many other countries, both for soil stabilization and because it's such a striking addition to the landscape. Its tolerance of adverse conditions has some people concerned that it could become invasive away from home. In addition, the trees produce chemicals that inhibit the germination of other species' seeds, ensuring that they have a nice, sunny territory all to themselves.

Many of the sumac leaves in our yard this year had potato-shaped galls, which I found were caused by a most interesting insect. A female sumac gall aphid (*Melaphis rhois*) migrates to sumac in the spring and produces a single female offspring. This tiny creature causes the sumac to create a soft, pouch-like gall within which the aphids reproduce parthenogenetically, resulting in hundreds of little female crawlers that feed on the inner surface of the gall. The gall I cut open in August was full of yellow, wingless aphids. By October, the inhabitants were gray and many of them had wings. At some point, they migrate to and feed on moss. All of this aphid's close relatives live in Asia, and scientists believe the bugs have had a relationship with sumac for more than 50 million years, when sumacs were dispersed across the Bering land bridge. This may be the oldest continuous association between an insect and a plant. The aphids do not appear to harm the tree.

The generic name *Rhus* seems to have come from the Latin word for sumac, but the origin of *typhina*, from what I've read, could be just about anything: *Typhina* may mean "like Typha," the Latin name for cattails, which also have a velvety surface; another author says it's because sumac was thought to cure typhoid fever. Or, it is claimed, it's from a word for "giant" because it's the biggest sumac. Or, says yet another, it's from a Latin word for antler – which staghorn sumac does indeed resemble.

Many kinds of bees collect both pollen and nectar from sumacs and the dried fruit clusters, called bobs, can be used to fuel the beekeeper's smoker. Native Americans used sumac as a source of smoke, too, in this case mixed with tobacco. Many tribes are reported to have used different parts of the tree to cure just about any imaginable illness. In somewhat more modern times, the stout branches have been hollowed out to make spiles for sugaring. A longer sumac pipe can be used to blow life into a reluctant campfire.

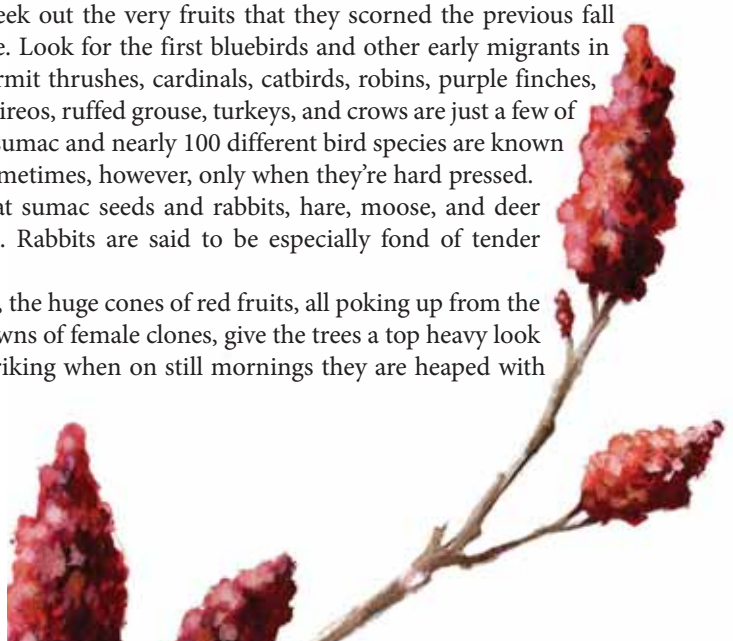
The name sumac may (or may not) come from "shoe-make" because the leaves and twigs are so rich in tannin that leathermakers of old preferred sumac for their finest grades of leather. Different parts of the tree can be used for making different colored dyes.

Sumac-ade, a tart drink with a lot of ascorbic acid, is made by soaking the fruits in warm or cold water. Water that is too hot releases tannins and makes the brew astringent. The drink needs to be strained through a fine mesh to get rid of the bristly hairs and any insects. Sumac has some notoriously toxic relatives and occasionally causes allergic reactions in sensitive people, so it may be a good idea to start out by drinking a small quantity of sumac-ade.

It is in late winter and early spring that the lowly sumac achieves heroic status, at least among the birds, who now seek out the very fruits that they scorned the previous fall when better fare was available. Look for the first bluebirds and other early migrants in the sumac patch. Flickers, hermit thrushes, cardinals, catbirds, robins, purple finches, evening grosbeaks, red-eyed vireos, ruffed grouse, turkeys, and crows are just a few of the other birds that gather at sumac and nearly 100 different bird species are known to have eaten sumac seeds, sometimes, however, only when they're hard pressed.

Chipmunks and skunks eat sumac seeds and rabbits, hare, moose, and deer browse the twigs year round. Rabbits are said to be especially fond of tender sumac seedlings.

After the leaves have fallen, the huge cones of red fruits, all poking up from the top of the wide-spreading crowns of female clones, give the trees a top heavy look – a look that is even more striking when on still mornings they are heaped with yet bigger cones of snow.



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The Spring 2014 issue deadline is December 23, 2013.

By Robert Kimber

Clunker

Acquiring cats is not difficult. Rita and I have never had to make the slightest effort to get a cat. Cats have come to us unbidden, like gentle rain or, more accurately, on those little cat feet Carl Sandburg attributed to incoming harbor fog.

Just as nature abhors a vacuum, so nature sees to it that a household welcoming to cats does not remain catless for long. Some of ours have come as gifts from friends or neighbors; others have just appeared on our back porch and made it clear they would like to stay. Notable among these was a burly, gray-striped tiger who showed up about ten years ago on a bitter cold January morning. Impressed by his mass and bulk, we called him Clunker.

When our queries around the neighborhood didn't turn up any missing cats, we took him to the vet for a checkup and immunizations, a step that made him our cat from that day forward. He quickly became fond of Rita and me, cozying up to us often for an ear scratch or a belly rub, which he usually acknowledged with purring gratitude, though he would sometimes haul off and whack us just to remind us that he had a wild, tough streak and we shouldn't take his amiability for granted.

Other human beings he wanted nothing to do with. A visitor had once caught him in an unguarded moment and managed to take his picture with a flash camera. That blast of blinding light left him permanently shy of strangers, and the mere sight of a camera would send him running like a movie star pursued by paparazzi.

His wild streak eventually proved his undoing. He insisted on heading out for a hunt every night despite our warnings about animals out there bigger and tougher than even the toughest house cats, and after one raw rainy night in November, he did not show up for breakfast. We notified the Farmington Animal Shelter and our neighbors that he was missing, but after December and January had gone by, we had to accept the likelihood that this hunter had become the hunted himself.

Then, in May, our friend David phoned one morning to say a gray-striped tiger cat had appeared in his barn. He had called the shelter and was told we had lost just such a cat back in November.

"David," I said, "that can't possibly be our cat. He vanished six months ago."

"Well, I know it sounds unlikely," David said. "But stranger things have happened, and if it's not your cat, there's no way I can keep it because I'm allergic to cats. I'll have to get the animal control officer to come get it."

With that, David had both planted a seed of hope and appealed to our sense of loyalty. If, by some fluke, that cat really was Clunker, we couldn't disavow him and condemn him to an uncertain and most likely hazardous future.

"Okay," I said, "we'll swing by and have a look."

By the time we stepped into David's barn, we were primed to find Clunker there. We probably would have convinced ourselves that a coal black Siamese was Clunker, but we didn't have to. When Rita saw that cat and blurted out, "Clunky!" he came racing over to her and rubbed up against her legs. He was Clunker, from the first whisker on his face to the last stripe on his tail. And hadn't he recognized us, for goodness sake? He just had to be Clunker, but of course he wasn't.

We needed several days at home with him before we began to catch on. He didn't love just us; he loved everybody. There wasn't a human lap in the world he wouldn't curl up in. He'd pose for pictures all day. He loved watching movies on the VCR. Go out at night? You've got to be kidding. There wasn't a trace of the wild in him. A lackadaisical hunter at best, he wouldn't tackle anything bigger than a vole or a mouse, and he much preferred baby mice to adults. When the first snowfall came, he didn't like the feel of it. He shook one paw, then another, came back in the house, and never went out again until the grass was green. He's a big furry cream puff, a hundred percent domesticated and loving every minute of it.

So, no, he isn't Clunker the First. He's a pretender to the throne, but because he's such a winning pretender, such a great conversationalist, such an affectionate and loyal pal who may bat you with a soft paw in play but hardly ever scratch, we don't hold that pretense against him. We rejoice instead in the company of Clunker the Second, clearly the world's handsomest, smartest, most perfect cat. Long live the king.

Robert Kimber has written often for outdoor and environmental magazines. He lives in Temple, Maine.

By Todd McLeish

All Quiet on the Western Front

More than 450 insects and 16 pathogens have colonized the forests and urban trees of the United States since Europeans first arrived, and the great majority of them are found in the Northeast. According to two studies led by U.S. Forest Service entomologist Andrew Liebhold, an average of 2.5 new forest insects became established each year, from 1860 to 2006, and about 14 percent of them have caused considerable damage to trees.

The long history of human settlement, shipping, and industry provides the most obvious explanation for why the Northeast is ground zero for damaging pest invasions, but there's more to the story.

"The forests of the Northeast are remarkably diverse, with many more genera and species of trees than in the West, and that has played a role in the insect invasions," Liebhold said. "Because we have more tree genera, it creates a bigger window of opportunity for these insects. About 65 percent of the insect and pathogen invaders colonize hardwood tree species. Had these non-native insects disembarked in a forest that is predominantly pine, for example, most wouldn't have survived to become the damaging pests that they are today."

Liebhold also said that most pest insects have associations with a particular tree genus, and the fact that many Northeastern tree genera also occur in Europe and Asia has facilitated insect invasions across the northern hemisphere.

The black vine weevil, found in Massachusetts in 1831, may have been the first invasive forest pest, though it turned out to be more damaging to ornamental trees than to forests. The first of the catastrophic insects to become established was the gypsy moth, which established in Medford, Massachusetts in 1869. It was followed by the chestnut blight fungus, first discovered in 1876 in New York City. Other notorious early arrivals include white pine blister rust in Maine in 1900 and the beech scale insect, the causal agent of beech bark disease, in Halifax, Nova Scotia in 1890. Among the 79 non-native forest insects considered damaging pests by the researchers, 19 were detected before 1900 and 75 percent were found before 1940.

BUGWOOD.ORG

This ugly fellow – a black vine weevil – may have been the first invasive insect pest in North America.

"There's a long lag time between when insects arrive in the U.S. and when they're discovered and we begin seeing damage, so there are probably a bunch of bad players established now that we don't even know about yet," Leibhold said.

Leibhold and his colleagues used their data to create the Alien Forest Pest Explorer, an internet-based tool that provides a county-by-county look at the geographical distribution of these pests across the country. Most counties in the Northeast are home to more than 30 non-native forest pests, with more than 40 found in most areas of New York, Pennsylvania, Connecticut, and New Jersey. This compares to fewer than 15 found in most counties in southern, central, and Rocky Mountain states.

"The West isn't likely to ever catch up to the East because the forests there just aren't as diverse," Liebhold concluded. "But they could have a bigger catastrophe there if a pest arrived to wipe out one important tree species, like ponderosa pine."

Cougar Towns

Controversy has been raging for years about the existence of mountain lions in eastern North America, a region where they once flourished. The U.S. Fish and Wildlife Service and the Canadian Wildlife Service have both concluded that the animal – also called puma, cougar, panther, catamount, and other names – has not persisted anywhere in its former range in the eastern U.S. and eastern Canada. Some researchers and government biologists reject the possibility that mountain lions are present in the region,

Game camera picture of catamount taken in Wisconsin; the cat was later killed by a car in Connecticut.

noting that they have been declared extinct in the wild by the U.S. government. Others have come to believe the mounting evidence. Sightings, tracks, and road-killed mountain lions have increasingly been reported in recent decades – more than 2,000 reports in the eastern U.S. since 1983 and 1,061 reports in Quebec between 1955 and 2005, including confirmed occurrences in seven eastern states and three Canadian provinces.

A team of researchers led by Francois-Joseph Lapointe at the University of Montreal used DNA analysis to identify 19 mountain lions out of 476 hair samples collected from scent-baited scratching posts in Quebec and New Brunswick between 2001 and 2012. Further analysis of mitochondrial DNA determined the geographical ancestry of the specimens, with six found to be of Central or South American ancestry and 10 North American. Three were indeterminate.

The authors of the study say that the mountain lions with North American ancestry could have been migrants from the western or southern parts of the continent, while those from Central and South America are likely to have been exotic individuals that were released or escaped from captivity. They noted that it is possible that, if the North American subspecies actually occurs in eastern Canada, they may breed with exotic subspecies, which poses additional challenges for conservation.

The implications of their findings are daunting. "Conservation biology requires not only scientific knowledge; it also relies on social, technical, economic, legal, and political considerations," the researchers wrote in *Northeastern Naturalist*. "The conservation and management of cougars in eastern North America is a perfect example of such intricate problems. It not only suffers from the lack of information on its presence in the wild, but also from inappropriate assessment of bio-political issues."

As mountain lions recolonize the Midwest and are now present in eastern Canada, the authors argue that it is time to develop management, conservation, and recovery plans and revisit the status of the species in both countries. They write, "Although public attitudes can be unstable towards conservation of large carnivores, protection of the cougar is warranted … for maintaining biodiversity as well as for the ecological role of the species."

Carbon Dioxide Fertilization Effect

Forests have become significantly more efficient at using water in recent decades, and a Harvard University study has concluded that this is primarily due to increased levels of atmospheric carbon dioxide. While studies have long predicted this, the researchers found that forests are becoming even more efficient than the computer models indicated.

To test whether what they call a "carbon dioxide fertilization effect" was taking place in forests, the researchers turned to long-term data gathered using a technique called eddy covariance. This system uses an ultrasonic anemometer and an infrared gas analyzer, mounted on towers above the forest canopy, to determine how much carbon dioxide and water are going into or out of an ecosystem.

They started with Harvard Forest, which has the longest continuous record of such data in the world, and found that forests were storing more carbon and becoming more efficient in how they used water. The phenomenon wasn't limited to a single region or forest, however. When they examined long-term data from around the world, the same trend was evident.

According to the research team, the process of photosynthesis itself is what leads to more efficient water use. Plants open tiny pores on their leaves, called stomata, to take in the carbon dioxide they need. As carbon dioxide enters, water vapor escapes. Higher levels of carbon dioxide, however, mean the stomata don't need to open as wide or for as long, so the plants lose less water and grow faster.

"We went through every possible hypothesis of what could be going on, and ultimately what we were left with is that the only phenomenon that could cause this shift in water-use efficiency is rising atmospheric carbon dioxide," Keenan said.

"This could be considered a beneficial effect of increased atmospheric carbon dioxide," said research associate Trevor Keenan. "What's surprising is we didn't expect the effect to be this big. A large proportion of the ecosystems in the world don't have enough water during the year to reach their maximum potential growth. If they become more efficient at using water, they should be able to take more carbon out of the atmosphere due to higher growth rates."

CHRIS VOGEL

A sonic aerometer for monitoring gas exchange between the forest and the atmosphere.

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David T. Mance III, s/s Editor

By Brett R. McLeod

Coppicing for Firewood

Of all the silvicultural techniques available to forest owners, perhaps no method is more underused than coppicing. Coppicing is a reproduction method where a tree is cut back periodically to stimulate new growth through dormant buds on the stump, or stool. In turn, these buds develop into sprouts or shoots, capable of growing firewood in just a few years, instead of the decades it takes to grow a tree from a seed.

Coppicing dates back to the Neolithic period when coppice wood was used for a variety of purposes, ranging from bean poles and laths to firewood and fence posts. In fact, the economic importance of coppice firewood was so significant that Henry VIII mandated that fences be built to protect coppice forests throughout England.

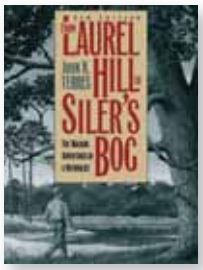
The most obvious advantage of coppicing is rapid growth, thanks to the already established rootstock. Larger stumps will produce more sprouts, so choose trees that are at least four inches in diameter. We're fortunate in the northeast that our most desirable firewood species (maple, beech, birch, oak, cherry, and hophornbeam) coppice relatively easily, using a five-step system:

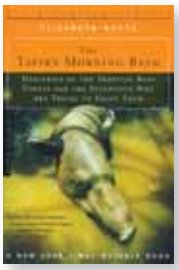
1. While coppicing can be done any time of the year, best results are achieved from late fall to early spring. Select trees with poor form that have little value as sawlogs or other forest products.
2. Cut low stumps, which will encourage the establishment of new shoots at or below ground level. This promotes the development of roots and increases the tree's stability. The ideal coppice stool should only be two to three inches above the ground, and should slope slightly to shed water. If you're harvesting a previously coppiced stump, make the same angled cut just above the point at which the stool splits into multiple stems.
3. If you live in an area that is prone to animal browse, I recommend placing branches around the stool as a deterrent. Another approach is to favor species that are less palatable to browsers. Beech and birch, for example, are less attractive to animals than maple or oak.
4. By late spring, you'll begin to see numerous sprouts emerge from the stump, each with a J-shaped leader. After leaf fall, clip off the smaller, less vigorous sprouts. I usually leave four to six vigorous sprouts per stool.
5. The amount of time it takes to produce your first firewood crop will vary depending on species, site, stool size, and desired firewood diameter. I tend to harvest most of my coppice firewood on an eight- to twelve-year cycle. From my more productive trees, this will yield firewood that's three to four inches in diameter – small enough to avoid splitting.

Because coppiced trees are kept in a juvenile stage, they will never die of old age. It is also worth noting that the benefits of coppice systems extend beyond simply providing firewood. The dense cluster of shoots around a stool provides important habitat for birds and small mammals. As for other uses, consider basket splints, stakes, bentwood furniture, and tool handles. Happy coppicing!

Brett R. McLeod is an Associate Professor of Forestry & Natural Resources at Paul Smith's College.

1. Fifteen-year-old coppiced gray birch.
2. Stool immediately after cutting.
3. Stool ten weeks after coppicing.
4. Shoots thinned in late fall.
5. Two 15-year-old coppiced gray birches and one 18-year-old coppiced American beech add up to a face-cord on the author's porch.






Some of our Favorites

We decided to switch things up in this issue. Instead of reviewing three new titles, we asked our regular columnists to weigh in on their favorite books that relate to the subject matter they write about. Any era would do – we simply wanted to know the best of the best. Here's what they chose:

From Laurel Hill to Siler's Bog: The Walking Adventures of a Naturalist

By John K. Terres with illustrations by Charles L. Ripper

The essays in this book are a distillation of the ten thousand hours John K. Terres, a lifelong naturalist and the retired editor-in-chief of Audubon magazine, spent in the 1960s searching out "the hidden wild things" of the then 600-acre Mason Farm nature preserve in Chapel Hill, North Carolina.

Terres displays all the tenacity and ingenuity of the most dedicated field biologists, hunkering down in a blind for hours, days, and weeks at a time, for instance, to watch a pair of red-tailed hawks hatch and rear their chicks. And to test his hunch that turkey vultures find their food by scent, rather than sight, he hides a dead possum in a hollow maple trunk to (successfully) lure the birds to his carrion bait.

But what sets Terres apart – whether his subject is muskrat, raccoon, or golden mouse – is his ability not just to track an animal but to walk in its footsteps, to identify totally with it and share its life experience. I don't know anyone else who writes with such unreserved love for the creatures he is studying, yet is able to do so without ever lapsing into sentimentality or Disneyesque anthropomorphizing.

"If I became philosophic about the wild things I studied on the Mason Farm," Terres tells us, "it was because I had learned to understand them. Over and over, the creatures of fur and feathers had shown me that they enjoyed living quite as much as I, or perhaps even more. With senses far keener than mine, they lived only from moment to moment, high-keyed, sensitive beyond powers of any human kind. For them, the instant is played to its fullest to satisfy some insistent need: to glory in savage pursuit, to taste quick fear and wild flight, to know in the next moment blessed forgetfulness or the full belly and innocent sleep."

UNC Press has kept this book in print. Treat yourself to it.

Reviewed by Robert Kimber

The Sibley Guide to Birds

By David Sibley

What they say about movies is true for field guide apps: the book was better. If you've resolved to learn birds in the new year, resist the bells, whistles, and tweets of your smartphone and its gimmicks for identifying a bird by region, color, size, wing shape, or vocalization. Dwell instead among the pages of a traditional field guide. In the book will you will find birds in context, arranged in the harmony of families, their relationships and subtle differences revealed. I learned birds (before the internet) by wandering page after page through field guides.

The Sibley Guide to Birds is a masterpiece. David Sibley's innovative layout features two species per page, arranged side-by-side. Rather than amassing details in a dense paragraph, Sibley surrounds illustrations with snippets of text pointing out crucial field marks. And in Sibley, illustrations abound. He portrays most species in flight, at rest, in immature plumage, in adult plumage and, when appropriate, according to season. The red-tailed hawk, admittedly variable, gets no fewer than 45 illustrations. If you travel, buy the single volume for all of North America (but lift it with your knees, not your back). Two smaller volumes (with smaller images) cover birds of the east or the west.

If Sibley presents a birder with illustration overload, the novice (and advanced) would do well with the National Geographic series. It offers fewer choices in a good way, emphasizing plumages we're most likely to encounter. Although it borrows Sibley's snippets, these guides have more text, but it's mostly helpful text. And unlike Sibley, National Geographic reprints its guides to reflect recent changes in taxonomy; so be sure to buy the most recent edition. In this series, owning both eastern and western volumes, with more detail in each, is better than owning the single combined guide.

Reviewed by Bryan Pfeiffer

Tracking and the Art of Seeing

By Paul Rezendes

Mammal Tracks & Sign: A Guide to North American Species

By Mark Elbroch

When asked if I would be willing to write a brief piece praising my favorite tracking book, I enthusiastically said "of course." But I simply can't single out just one book. Anyone who's been in my home knows that it's really a library with floor-to-ceiling books in all rooms except the kitchen and bathroom. I love books so much that I guess I subscribe to Erasmus' philosophy: "When I get a little money I buy books, and if any is left over I buy food and clothes."

Hands down, my favorite two books are Tracking and the Art of Seeing, by Paul Rezendes and Mammal Tracks & Sign, by Mark Elbroch. Both volumes are richly illustrated with beautiful original photos of tracks and sign, as well as the animals themselves, and both books are superb resources for both novice and professional trackers and naturalists. Both authors are nationally known, not only for their skills as trackers but also for their leadership in advancing tracking knowledge and authenticating its usefulness in wildlife research and conservation planning.

Reviewed by Susan C. Morse

A Natural History of Trees of Eastern and Central North America

By Donald Culross Peattie

I've quoted from Donald Culross Peattie so many times that, collectively, it might add up to a copyright infringement, although being as my favorite DCP (as I call him) book was first published in 1948, perhaps I needn't worry.

There's nothing wrong with the field guide parts of this book, but the best comes when every tree gets an essay – really a eulogy. Peattie tells how each tree species fits into the landscape, how various parts have been used by people throughout history, or how animals of every size and type use the fruits, flowers, or bark, with special attention to birds.

His trees have yearnings, fears, and loves: "Besides shade, the Hemlock loves rocks; it likes to straddle them with its ruddy roots, to crack them with its growing, to rub its knees against a great boulder." We're advised not to say things like that anymore, but his intimate, sensuous knowledge of every woody species couldn't be conveyed in any other way. Well he knows how to flatter his leafy friends: Hornbeam gives "a shade cool, yet not dark"; dogwood is "starred with snowy blossoms"; beech "stands in a profound autumnal calm, enveloped in a golden light that hallows all about it."

Often he laments the careless destruction of America's primeval forest, the huge cherry trees and giant sycamores that will never be seen again, but in the next paragraph he's full of praise for the glorious cities and industries that trees have built. Change – fewer wooden boxes and more cardboard, for instance – bothers him, but he's fully at home with a tree's transition to lumber, extolling the wood as gushingly as the tree that was felled to produce the table, axe handle, or house.

Reviewed by Virginia Barlow

The Tapir's Morning Bath

By Elizabeth Royte

Halfway through reading The Tapir's Morning Bath, I knew I was going to write my first book, even though I had never given much thought to writing a book before. Journalist Elizabeth Royte spent a year living at the Smithsonian Institute's tropical research station on Panama's Barro Colorado Island, where she volunteered to help scientists with their research and wrote about her experiences. Her tales of challenging conditions, grumpy researchers, enthusiastic students, and the unusual assignments they gave her – from collecting monkey droppings and sorting bugs to counting seeds and tracking bats – inspired me to follow in her footsteps and volunteer with biologists studying New England's rarest wildlife.

Her experiences were far more challenging than mine. Royte writes of the difficulties of warming up to a group of scientists who weren't expecting a journalist to drop into their midst – they ignored her for the first weeks. But eventually they enlisted her help in their efforts to understand the intricacies of the tropical ecosystem, allowing her to not only write portraits of the complicated scientists at work but also expose the tensions and humor involved in their studies of an environment that is rapidly becoming degraded. In the end, The Tapir's Morning Bath is an adventure story and scientific exploration wrapped in the author's personal story of loneliness, pregnancy, and intense curiosity about the natural world.

Reviewed by Todd McLeish

The Art Spirit

By Robert Henri

"In certain books, some in the first few paragraphs, you know you have met a brother," writes painter and teacher Robert Henri. Thousands of artists feel this way about Henri's book, The Art Spirit. It is a splendid compilation of articles, letters, and inspirational notes. Though it was written nearly 90 years ago, it remains fresh, relevant, and inspiring to all who appreciate art.

The book is a compendium of Henri's practical advice and philosophical musings about art making. Henri says, "Art is the inevitable consequence of growth. The work of art is a result. It is not an end in itself, but the work indicates the course taken and the progress made. It is the impress of those who live in full play of their faculties. It is the study of our lives."

The book is also dotted with succinct practical truisms that are lighthearted and witty: "All who are wise take wonderful care of their brushes."

Beyond the focus of art and art making, *The Art* Spirit is full of advice about working hard and living a life fueled by curiosity and bravery. It is a book of encouragements; a benevolent call to awaken our senses, to push our faculties to their absolute highest abilities. It is full of pearls of wisdom: quotes that one invariably finds tacked to studio walls across the country, across the ages. It is a wonderful book for someone setting off down the path of art making.

Reviewed by Adelaide Tyrol

Dear Fisher Cat (Martes pennanti)

Never seen you in the flesh. I've seen
a cousin, martes martes, stuffed, in a shop window
in Bavaria, where they chew wiring in cars,
and martes zibellina turned
into a coat, thicker than mink, the price of a house.
I tried it on, with awe.
I watched martes fiona on YouTube,
the woman holding the camera cooing
while the small, shy animal
nosed around her terrace in the English countryside.
Your name in Croatian, Kuna, is currency.
Seven million years old, much older than homo,
and certainly sapiens. Trapped to the brink
of extinction, you came back.
You are to the others as the javelina is to the wild boar,
a new world clade. Neither fisher nor cat.
Some people love bears or whales
or whooping cranes; I love you:
your sweet round ears and button nose,
your fur heavy as the robe of a queen,
your claws unsheathed in paws
the size of a child's hand. You could be a toy, a cartoon,
a pet, if it weren't for your carnivorous drive,
your solitary soul. Your jaws can kill a porcupine,
attacking snout first from below, eating it inside
out. You cross the narrowest gap
in the forest opening. You sleep in the crook
of a beech in old-growth canopy. I'll see you someday,
close range. I'll be the rabbit
curled in a corner of the parsley garden
and you—you'll be there, unnoticed
until too late, to swallow all the sounds my gullet makes.

NATASHA SAJÉ, from Vivarium, Tupelo Press, 2014

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By Adelaide Tyrol

Snow Ledges VI, 42" x 42", oil on canvas, 2012

Thomas Crotty, a Massachusetts native, moved to Maine in 1964, drawn by the power and beauty of its coastal landscape. At the solo retrospective of his work at the Portland Museum of Art, then director Dennis O'Leary said, "For more than four decades, Thomas Crotty's disciplined and luminous paintings have surveyed Maine's exclusive realm, demonstrating an extraordinary sensitivity towards space, texture, the mutability of water, and the vitality of light." Crotty seems particularly drawn to the unique aspects of winter in Maine, and it is interesting to study what it is that make these particular paintings so memorable.

In Snow Ledges VI, the gravitas of the sunlit outcrop as it pushes towards the dark sea makes us feel the power and order of the earth. Crotty employs the bold interplay of light and dark – called chiaroscuro – to structure his painting and give it a dramatic punch. The movement of the glacial heave is a portrait of nature at a certain time in a certain place, but it also portrays a profound sense of timelessness. It is a splendid study in the tension of opposites – between light and dark, cold and warm, wet and dry – that are highly rendered in places and simply suggested in others. It is the back and forth of these extremes that grabs us in the gut and gives this painting its complexity and depth.

Thomas Crotty lives and works in Freeport, Maine. He is the owner and founder of Frost Gully Gallery. Since 1969, his work has been featured in several solo exhibitions in Maine art institutions including the Farnsworth Art Museum, the Bates College Museum of Art, the Van Vechten Gallery of Fine Arts at Fisk University, and the Maine Center for Maine Contemporary Art. He may be reached through his gallery website: www.frostgullygallery.com

Call for entries: Send us your Outdoor Palette submissions. Contact Adelaide Tyrol at (802) 454-7841 or atyrol@ostudio.com for details.

A PLACE in mind

Laird Christensen

Behind the wedding-cake church belfry on the East Poultney green, the shoulder of Howe Hill rises, shaggy with maples and a few old pines. This hill, a stubborn chunk of old Taconic ridge, is named for the family that built the first grist mill at the red slate falls of the Poultney River. For several years, my partner and I rented the old Howe place at the foot of hill, but when our son was born in 2009 we bought a home two centuries newer and just around the bend, high in a meadow rolling down to the river.

At first, I hoped to let the woods grow in around our new house, leaving space for only a small lawn and garden. See, growing up out West I've spent much of my life in wilderness areas – the wilder the better. Places like the Kalmiopsis and Never Summer Wilderness. The River of No Return. After a week or two away from phone calls and deadlines, even avoiding other backpackers, I would come out feeling whole again. I relied on wilderness to remind me how trivial our modern lives can become.

So it was an adjustment moving to Vermont, where the forests have been cleared, and cleared, and cleared again. But after thirteen years I've grown used to stone walls running through the woods and barbed wire beneath the bark. I don't mind anymore that old-timers remember cows grazing where trees now cover Howe Hill. No, it's not wilderness. There are no ancient forests or untouched miles to show our insignificance. But even this overgrown pasture can tell part of the same story, with its wind-splintered pines and seedlings in the sedges: this world's messy work goes on and on, an endless tangle of fertility and destruction, with absolutely no regard for our ideas of order.

Because I'd like my son to grow up with that story – to carry it with him as a charm against our usual self-absorption – I had to wonder if perhaps the greatest gift we could give Addison would be to release these meadows and raise him on land growing back to wild.

Well, three years later our land is still open.

I'm not sure if it's hypocrisy or just irony, but despite my faith in the lessons of unmanaged land I seem to be managing our eight acres more intensively each year. Even as I welcome aspen and sumac into a sunny gap along the road, I'm pushing back our lawn to keep away the ticks, making room for more fruit trees and rows of berries. Come spring, I grab a spade and root out the wild parsnips sneaking down from the road, determined to protect my family from scars like the one those yellow flowers left on my chest. And I love our view across the lower meadow, especially when fog from the river comes spilling through the moonlit grasses.

I've come to admire how our neighbors manage their woodlots and sugarbushes. My son and I put in a few taps this year, but aside from a strip of woods along the road and another shading the river, we have just a pocket of young trees behind the house. Still, there's more than one way to manage land – to handle it as "manage" originally meant, like a rider handles a horse. We've kept the meadows open, but we are letting one corner grow up; soon the deer will be able to follow our brook down to the river without leaving the woods, except to cross a quiet road. I love to watch that corner growing shaggy, seeing what this land has to say.

I'm protective of those trees along the river – maple and elm mostly, some ironwood – especially when someone suggests opening a view or thinning them for firewood. Even if I had no clue what shade means to a river, I have other reasons for guarding that narrow stretch of forest. We set a bench among the ferns beneath a big cottonwood, looking out to the swimming hole that Irene left when she took away the island. Late in the day, I'll sit there and watch a heron come gliding down to a shallow pool where she'll stand waiting for dinner, or a muskrat nosing through the leaf-green water.

Sure, spending time by the river is no week in the backcountry, but just the hushing of that current brings me back to a world that's too wild – too willful – to fit into our little grids, the hours and acres we use to measure it. And if I'm still there when daylight fades, I may hear something moving through the trees behind me: a snap, a rustle. Then I know it's time to leave the river to the deer coming down from Howe Hill.

Laird Christensen teaches writing and environmental studies at Green Mountain College. After many years of wandering, he is currently at work on a book about the process of learning to feel at home in Vermont.

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